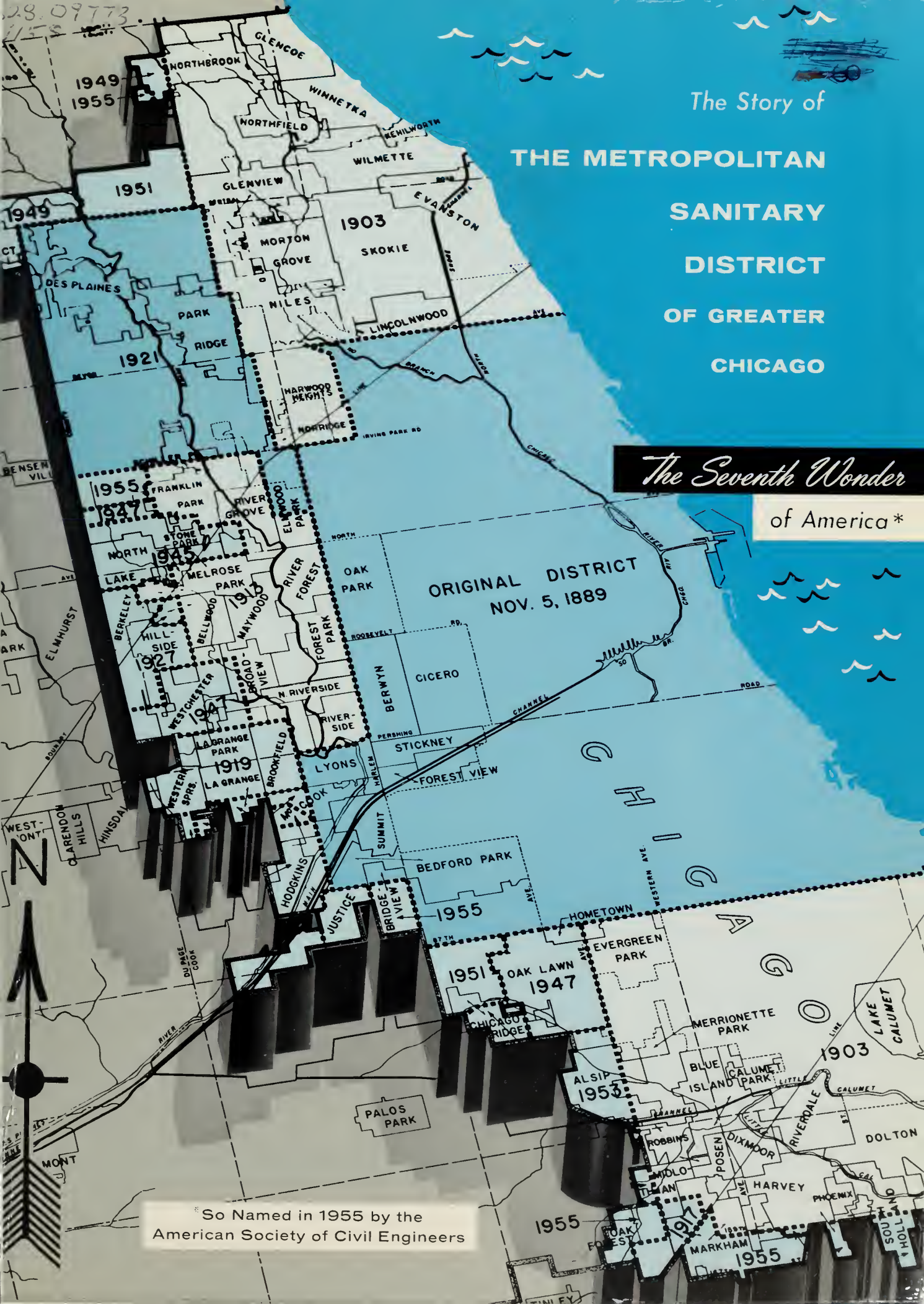
The Story of the Metropolitan Sanitary District of Greater Chicago. (1957?)



*So Named in 1955 by the
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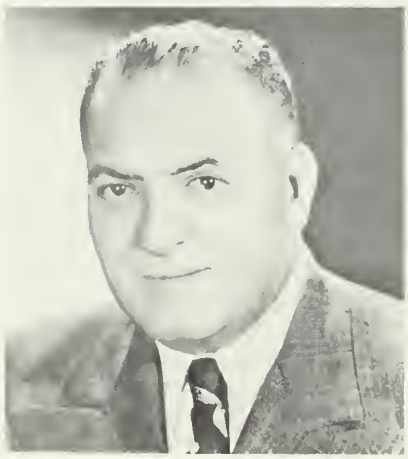

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The Story of

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

The Seventh Wonder

*of America**

by Ward Walker

*So named in 1955 by the American Society of Civil Engineers

foreword

There is, I suppose, no governmental agency that does its work less obtrusively than The Metropolitan Sanitary District of Greater Chicago. The most law-abiding citizen is constantly aware of the police department, even if it presents itself in no more ominous guise than a traffic officer. The householder fortunate enough to escape fire cannot close his ears to sirens. Parents live in constant contact with schools. Every motorist comes face to face with the department of streets whenever a barricade blocks his favorite route to work. Let garbage accumulate for more than a week, and a family suddenly becomes conscious of the fact that a municipal agency isn't functioning on its customary schedule.

But in the course of ordinary living, nothing calls attention to the work performed by the Sanitary District. Yet one could argue that a prolonged failure on its part would bring about a greater disaster than a failure on the part of any other governmental department. Without fire protection for thirty days, the metropolitan area of Chicago might conceivably escape a devastating conflagration; the lack of a police force for that period would probably not bring on anarchy; the lives of children, deprived of school for an extra month, would be stunted to no discernable degree. But close down the Sanitary District for one month, and five million people would face stark, certain, and irrevocable disaster.

For human waste, uncared for, will breed disease as certainly as rabies follows the bite of a mad dog. The mortality figures which Mr. Walker cites, comparing Chicago's death rate before and after the creation of the Sanitary District, prove that point conclusively. And how much more dangerous, potentially, now than then! Consider the concentration of population, the multiplication of disposable material, both human and industrial, and imagine, if you can, the epidemics of typhoid fever and amoebic dysentery, to mention no other killers, that the untrammeled course of nature would lead to in thirty days! The frightful threat of germ warfare holds no more terrifying prospect.

All this goes to show that the Sanitary District, in causing its own history to be recorded, deals with no small subject. Unorthodox perhaps, without glamour certainly, and concerned with facts of life that many people prefer to ignore—but not small. If importance, measured by that most fundamental of all standards, life or death, be a justification for history, then this study needed to be written.

In telling the story, Mr. Walker had a variety of choices. He could have omitted the historical background and jumped into his narrative in the year 1889, when the Sanitary District was established. (I am glad that he didn't.) He could have burdened his account with technical details beyond the comprehension of the layman. (Again, I am glad that he didn't.) He could have raked scandals out of the past and by implication, if not by direct statement, drawn comparisons not unfavorable to the regimes of recent years. Or he could, had he chosen, have produced a cleverly veiled eulogy of the present trustees.

Instead of following any of these courses, Mr. Walker has written the story straight, sketching the essential historical background of the Sanitary District, outlining its organizational history, describing its technical processes and achievements in terms that a citizen unversed in history can understand, and explaining the importance of its services by facts more convincing than inflated claims. The historical literature of the Chicago region would be the richer for more publications of this kind.

Paul M. Angle, Director,
Chicago Historical Society

The Seventh Wonder

president's message

This brief panorama of the water, sanitation and navigation problems of the Chicago metropolitan area is presented on the occasion of the dedication of the new administration building of The Metropolitan Sanitary District of Greater Chicago.

The administration building was financed in a unique manner and *without any additional tax levies,* through a bond issue of $1,350,000 to be paid within fifteen years with monies heretofore applied to rents. It was a sound business step. The new building contains about 55,000 square feet. Comparable space would cost at least $5.00 per square foot or $275,000 per year. The operation and maintenance of this building has been estimated at about $80,000 per year. The retirement of the indebtedness during the next fifteen years will amount to about $110,000 per year. And so, as compared with the rental of $275,000 per year, the new administration building will afford a savings in cost to the District of $85,000 per year during the first fifteen years and thereafter a savings of $195,000 per year.

This is in keeping with the economy program of the District. It has held its budgets down, it has adopted a "pay-as-you-go" program for new construction, it has substantially increased its revenue from sources other than taxes (fertilizer income, rents, and interest on idle funds)—it has streamlined its purchasing procedures and it has adopted a model civil service system.

But more important was the encouragement of an expert engineering staff which had the talent and ability to make the District's sewage treatment works one of the seven engineering wonders of America; and did this although nowhere in the World is there a city whose sanitation problems are equal to ours.

Although we have the world's *largest* sewage treatment system today, we must realize that we are only on the threshold of a huge population increase in the near future. With the probability of a population increase to fifteen or twenty million in this metropolitan area within our time, it is readily apparent why there is so much concern about our common governmental services. Commissions and committees have explored this problem for many years and are still studying it, seeking the metropolitan answer.

In the meantime, it is fortunate for Chicagoland that at least in the field of sanitation the District has been able to become and actually to function as The Metropolitan Sanitary District of Greater Chicago, serving not only Chicago but 85 adjoining suburbs.

And so as we move our technical staff of design, operations and maintenance into our new administration building, we will be better prepared to plan for the solution of the tremendous drainage and sanitation problems which will confront us in the near tomorrow in the world's largest and greatest metropolitan area.

Anthony A. Olis

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1. the problem

1. GREATER CHICAGO TODAY

One of earth's great cities, Chicago today sits at the world's hub.

Raw materials from the far corners of the world flow in an ever-swelling tide into her factories and plants. Planes, ships, trucks and railroads shuttle in and out at the rate of a dozen per second, night and day, seven days a week.

Her harbor and canals handle more ship cargo than the Panama canal. She is one of the greatest slaughtering and meat-packing centers in the world. Her factories and plants daily turn out a fabulous wealth of finished goods.

Chicago's State street is one of the world's fashion and market centers; her Michigan boulevard one of the most beautiful avenues ever built by man. The Merchandise Mart is the world's largest civilian building, topped only by the Pentagon in Washington, D. C.

Most of the grain raised in the mid-west, the world's bread-basket, is bought and sold on Chicago's Board of Trade. She is America's convention center, the site of the world's greatest printing plant, the greatest railway center, the steel metropolis.

The atom was first tapped for its unlimited power in a makeshift laboratory under the stadium at Chicago's Stagg field. Her universities and trade schools rank among the world's finest. Her hospitals and medical research facilities are known the world over.

Her quiet thriving suburbs surround her on the north, west and south. At her eastern edge lies Lake Michigan, a boundless source of fresh water . . .

—*W-a-t-e-r* . . .

The word is laced through Chicago's history from its start to the present day. Without its limitless supply Chicagoland could not have flourished. Because of it the area's long range future is bright.

The water and the land were here. Men of vision discovered and developed the site. Men of muscle and brains joined them and hammered these natural assets into the foundation of a great city.

One of their best weapons has been The Metropolitan Sanitary District of Greater Chicago,* created to protect the water supply—to keep the industrial and domestic wastes of America's second largest city from polluting Lake Michigan, the water source.

This was the weapon those Titans of early Chicago days used to reverse the flow of the Chicago river. And today that weapon—The Metropolitan Sanitary District of Greater Chicago—is the world's largest and finest sewage disposal system, one of the seven greatest engineering achievements in the history of man.**

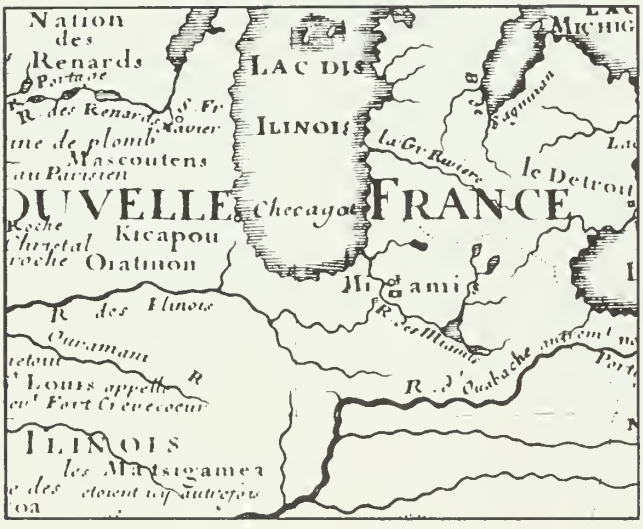
**Called "The Sanitary District of Chicago" until 1955.*

***Named in 1955 as one of the "Seven Wonders of American Engineering" by the American Society of Civil Engineers.*

THE BACKGROUND

In the dim reaches of time, according to geologists, what we call the Chicago River was a stream flowing out of Lake Michigan and into the Desplaines and Illinois valleys to find its way to the Gulf of Mexico even as now.

Then one prehistoric day the earth's cooling crust buckled slightly, an infinitesimal shift compared to the furious upheavals which spawned our mountain chains. But it was enough to raise a barrier of stone and send the waters of the river flowing into Lake Michigan as they were when the Indians came upon the scene and as they did until Chicagoans changed them.



For the most part the land at the mouth of the river near what is now Madison street was low and marshy. There was a small rise, an exaggerated hummock, at Wacker drive and North Michigan avenue, later to be the site of Fort Dearborn. Still another dry spot, a camping ground of Indian hunting parties, was at Randolph and Clark streets, now site of a new bus terminal.

So it was when the first white men to see it, Louis Joliet and Father Jacques Marquette, seeking a shortcut from the Mississippi into the Great Lakes, came upon it: a land of marsh and forest, a hunting ground for Indians, and a water gateway to the interior of the New World.

Their voyage was made in 1673. Joliet and Father Marquette learned from the Indians of the shortcut by portage which led to Lake Michigan. They paddled up the Illinois River, which Joliet named the "Divine", ascended the Des Plaines River to a point near Riverside, and dragged their canoes across the Indian portage to the Chicago River which he named the "Portage".

Their find weighed heavily in the chronicles of their trip for they told of the great empire lying west of the Great Lakes, an empire whose key was a small river emptying into Lake Michigan at its southwestern tip.

To them, as to the rest of the world, water was the only practical method of travel and transportation over long distances. The seas and lakes and streams were the highways of the day. For that reason, if for no other, the marshy land at the mouth of the Portage (or Chicago) River was destined to play an important role in the history of the New World.

Meanwhile the American colonists were consolidating their beachheads on the Atlantic coast, founding cities, planting the seeds of freedom, and pushing ever westward.

Joliet La Salle Marquette

The findings of Father Marquette and Joliet were substantiated by Fathers Allouez and Gravier, who founded a mission at Kaskaskia on the Illinois River, and Robert Rene Cavelier, Sieur de La Salle, who used the Chicago River on his travels.

But for the most part it was only nameless hunters and trappers who visited the site until some years after the Revolutionary War. There was proof, however, that Chicago's importance was not forgotten: on August 20, 1794, General Anthony Wayne defeated the

Indians in the battle of Fallen Timbers, Ohio. In the subsequent treaty the Indians yielded their claim to large areas northwest of the Ohio River, including a tract six miles square at the mouth of the Chicago River.

At that time the only permanent resident of the tract was a Negro, Jean Baptiste Point du Sable, who aspired to become chief of the Pottawatomis. He built his home on the north bank of the river at the lake in 1784.

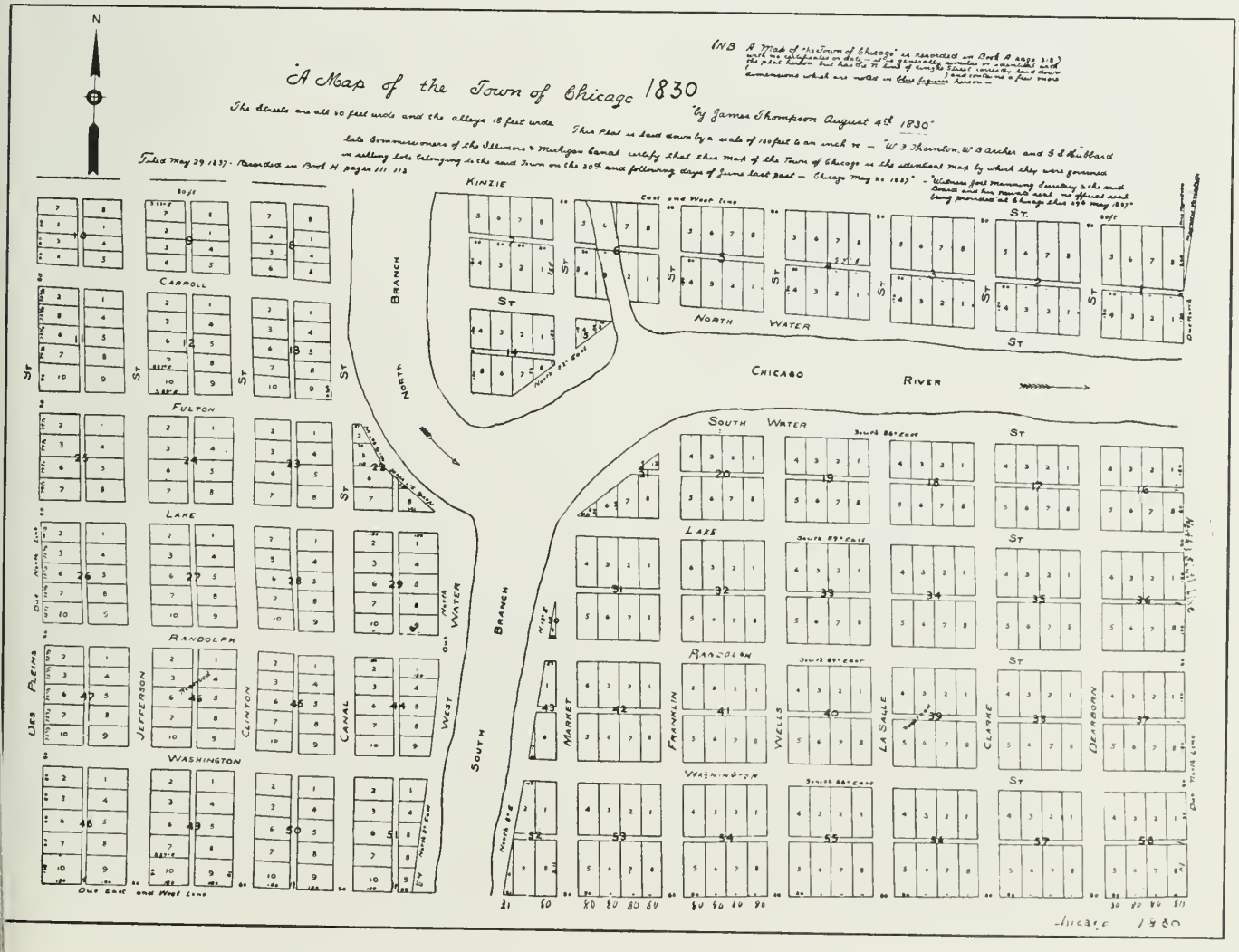
In 1796, du Sable sold his property to a Frenchman, LeMai, who in turn sold out to John Kinzie in 1804. Kinzie, known as the Father of Chicago, established a trading post within sight of Old Fort Dearborn, built in 1803.

Some few pioneers entered the area and established homesites and the old fort with its garrison of 69 officers and men maintained peace with the Indians until the war of 1812 when the natives sided with the English.

Fort Dearborn was in jeopardy and on the morning of August 15, 1812, the garrison was ordered to fight its way through the surrounding Indians, a desperate measure forced by lack of food and supplies. With the women and children in the center of the square they marched to what is now Roosevelt Road before they were ambushed. They fought their way south along the lake shore to what is now 18th street before they were overwhelmed. All except 25 men and 11 women and children were massacred.

Fort Dearborn was rebuilt after the war in 1816 and once again settlers moved into the area, trade flourished, and the work of building an empire went on.

In the same year a far sighted governor of the Illinois Territory, Ninian Edwards, took the first practical step toward the construction of a canal between Lake Mich-



1. the problem — cont'd.

igan and the Illinois River. He negotiated a treaty with the Indians giving the pioneers a strip of land about 20 miles wide from the mouth of the Chicago River to the junction of the Des Plaines and Kankakee Rivers, and 10 miles wide from there to the Fox River.

Two years later, in 1818, Illinois became a state.

Steadily the flood of Americans pushed west, a tide which is still running today and which has moved the United States' center of population into the middle west.

By 1822 the stage was set for the official act which was to make Chicago one of the world's great cities. On March 30th of that year, the United States Congress authorized Illinois to build the Illinois and Michigan canal, eliminating the portage between the Chicago and the Des Plaines Rivers.

Since Illinois with a total population of 60,000 persons was unable to pay even for the surveying of the route, Congress in 1827 granted the state 285,699.11 acres along the route of the canal. This land was to be sold and the proceeds used for construction of the I & M canal.

By 1829 the state legislature had set up land commissioners to establish towns, sell lots, and raise the construction funds. The first Chicago lots were sold September 4, 1830, in accordance with a plat dated August 4 of that year, the geographical beginning of the city.

The platted area was ⅜ths of a square mile, running from Kinzie street on the north to Madison street on the south; from Des Plaines street on the west to State street on the east.

The highest price paid in that first sale was $100 for an 80 by 180 foot lot on the river. The land on which the Wrigley Building stands could have been bought for $1.25 per acre. The corner of Lake and Dearborn streets sold for 50c per front foot.

During the next two years little interest was apparent in the purchase of Chicago real estate; as late as 1832 a corner of Randolph and Dearborn streets sold for $60 and a corner at Lake and Wells streets for $39.

There were 12 houses in the town and Mark Beaubien's tavern, but as steps went forward to build the canal, the land boom began.

The canal wasn't scheduled to start until July 4, 1836, and it wouldn't be completed until 1848, but already its possibilities were beginning to intrigue men. Charles Fenno Hoffman, author of *A Winter in the Far West,* wrote in 1834:

> "There is one improvement to be made, however, in this section of the country which will greatly influence the permanent value of real estate in Chicago. I allude to a canal from the head of Lake Michigan to the head of stream navigation on the Illinois River, the route of which has long since been surveyed. The distance to be overcome is something like ninety miles . . . St. Louis would then be brought comparatively near to New York, while two-thirds of the Mississippi Valley would be supplied by this route immediately from the markets of the latter. The canal is the only remaining link wanting to complete the most stupendous chain of inland communications in the world."

Early in 1833 the prices of land commenced to rise, reflecting the arrival of more and more settlers; nearly 200 new buildings were erected during the year and the first newspaper, the Chicago American, made its appearance.

By the end of 1833 the population was 350. Within a year the city numbered 2,000 inhabitants. By the close of 1836 the city boasted the four story Lake House, built at a cost of $100,000 on the block between Rush street and Michigan avenue at the river.

The historic Lake House on the north bank of the Chicago River at Rush St.

A newspaper correspondent from the East revisited Chicago in January, 1837, after an absence of two years and reported his astonishment:

"I can scarcely recognize it as the same spot. Where then I walked over the unbroken prairie, the spacious avenue is now opened, crowded with carts and wagons, and occasionally a showy family rolling and dashing in the hurry of trade, or the pomp of the native "sucker" stumbling as I do, over bales and boxes on the sidewalks, or gaping at the big signs and four-story brick houses."

Meanwhile, Cook county was created on January 15, 1831, by action of the state legislature and the town of Chicago was incorporated August 12, 1833. Later, in 1837, the town was organized into a city.

By 1840 the population had grown to 4,470 persons; in 1848, the year the canal was opened, the city numbered 28,000. Within 12 years, by 1860, the population was 109,260, an increase of nearly 400% in little more than a decade.

Before the I & M canal, St. Louis was the metropolis of the midwest, the trading point where goods from the east were exchanged for the furs, grain and raw materials gathered from the farmers and trappers. These goods had to be shipped via New Orleans by river packet.

With the canal, Chicago became the trading center, the transfer point. The wealth gathered in the canal days was later to bolster Chicago's position when the railroads sought capital. As the web of steel rails spread out from Chicago the city settled more firmly into the throne of the Queen of the Prairie.

WATER AND SANITATION

In common with the rest of the world of that time, the early residents of Chicago had little knowledge of sanitary engineering and the disease-breeding potential of filth and waste.

The early settlers dug shallow wells for their water supply and depended on outdoor privies for sewage disposal. By 1836 these vaults had contaminated many of the wells and the diseases carried by polluted water—typhoid fever and amoebic dysentery—were raging.

With every ship bringing new settlers and with the overland trails crowded with wagons heading for Chicago and the west, the problem of uncontaminated water was soon pressing for attention.

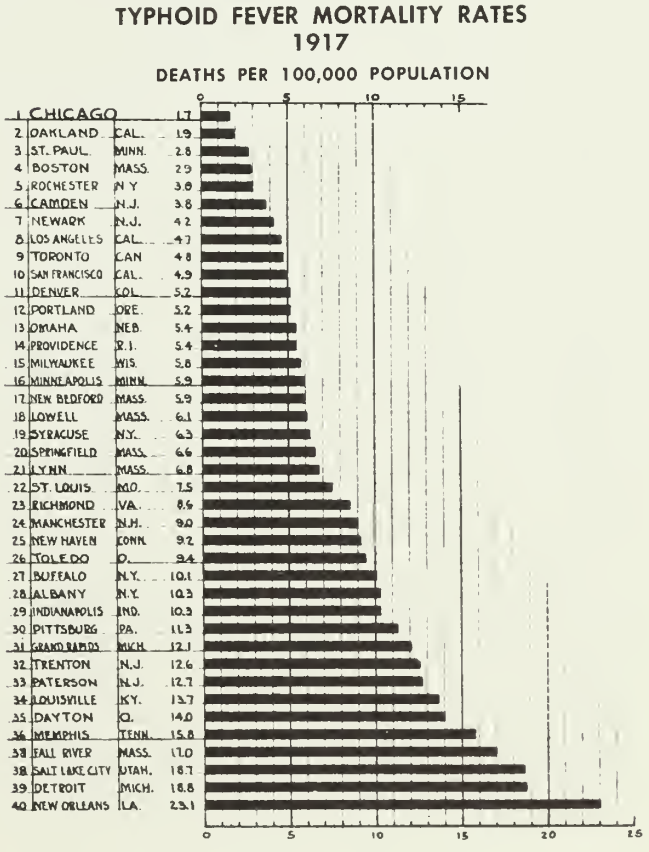
Some enterprising gentlemen formed a water company which for a time peddled lake water by cart, much as milk is distributed today. The demand for the clear and wholesome product was so great that another company was formed, this one piping water from the lake.

The newly formed city government took over this pipe company and immediately ran head on into a problem which was to plague—figuratively and literally—Chicago until 1900: the waters of the Chicago River were polluted and they ran into the lake, the source of the drinking water, as did the street sewers along the lakefront.

In those early days, with an empire a-building, with land values skyrocketing and fortune waiting for the man bold enough to take it, the problem of contaminated water must have been a nuisance, a pesky problem to be solved as quickly and as easily as possible.

The city's answer was to tunnel out into the lake beyond the limits of polluted water. The city grew and the city fathers found the contamination pushing ever farther into the lake. They drilled a new tunnel still farther out.

Even at best this was a makeshift safeguard, subject to the whim of the wind. Throughout these years the death rate from water borne diseases ran about 50 per 1,000 persons per year.



1. the problem — cont'd.

In 1854 a cholera epidemic attacked the city and destroyed 5½% of the population. This plague aroused the citizens to the urgency of their problem and raised demands for a sewerage system.

Work on this project was started in 1856. Those early Chicagoans were far-sighted and full of pride in their new city for this integrated sewerage system was the first in the United States and only the second in the modern world—Hamburg, Germany, having built one twelve years before.

As previously noted, most of what is now Chicago's loop was low and marshy. This problem was whipped and the sewerage system project simplified by building the sewers at ground level and filling in over them. In effect, this raised the level of the loop about ten feet, insuring drainage.

The sewers ranged from three to six feet in diameter and were built of brick. Many of them are still in operation today, mute evidence of the engineering skill of the men who planned them.

However, most of these sewers drained into the river, further complicating the water supply problem. Again and again the water tunnels were drilled farther out; estimates of the number of these old tunnels still in existence although not in use run as high as sixty-four.

The city continued to grow, the volume of the sewage became greater, the Chicago River became a fouler stream, and by 1862 Chief Engineer Chesbrough of Chicago reported the city's water supply was seriously menaced by the growing pollution of the river. He added the taste of wastes could be detected in the water, particularly the trade wastes of the packing houses and rendering works.

Engineers decided that if the I & M canal were deepened it would reverse the flow of the Chicago river with its pollution-load and carry it away from instead of toward the lake.

The theory was sound but nature was to prove too stubborn to be whipped so easily. The $3,000,000 project—half the cost of the original canal—was started in 1865 and finished in 1871, the year of the great Chicago fire.

For nearly a year the system worked and Chicagoans believed the problem was solved. However, land promoters had cut through the Ogden-Wentworth ditch from the Des Plaines River to the west fork of the south branch of the Chicago River. This was done to drain the Mud Lake area and make it habitable.

A heavy flood late in 1872 enlarged this ditch. This let the waters of the Des Plaines enter the Chicago River during freshets, a flow of water sufficient to offset the maximum flow of the I & M canal. The effect was to short-circuit the entire system, back up the sewage in the Chicago River, and continue the pollution of the lake.

Chicagoans, however, had a city to rebuild, a city which had been gutted by fire with 13,500 buildings destroyed and property lost to the amount of 192 million dollars. It wasn't until 1881 that the citizens could again turn their attention to the problem of sanitation.

In that year it was decided to ride the same horse a little farther. Giant pumps with a capacity of 60,000 cubic feet per minute costing $251,177 were installed at the junction of the I & M canal and the south branch of the Chicago River.

The theory was these pumps could pull enough water from the river into the canal to offset the flowage from the Des Plaines which was short-circuiting the drainage system. The pumps were put into operation in 1884 and proved unsatisfactory.

Experiments were still going forward a year later when nature pulled the trigger on the entire mess, forcing Chicagoans to roll up their sleeves and face the problem squarely.

THE CRISIS

The heavy black clouds hanging over Chicago on August 2, 1885, opened shortly before dawn. The rain came in solid sheets—"A cloud buster," the citizens called it.

All through the day the rain continued, pouring steadily until the morning of August 3. A total of 6.19 inches fell, one of the greatest rains in Chicago history —a rain which challenged in grim terms the future of the growing city.

Chicago had reached a population of 750,000 persons. It was a dynamic city, still in its teens but already showing the sinews and muscles of commerce and industry which could make it top city of the world.

One complex and terrible problem—a problem brought to a head by the downpour of August 2-3, 1885 —was pollution. Was a city which had survived Indian

massacre and the great fire to choke on its own wastes? For a time after the record rain it seemed the answer was "Yes".

The rain scoured clean the city's streets, sewers, catch basins, and the Chicago River into which most of the sewers emptied. The flood waters short-circuited the makeshift pumping system designed to pull the river flow into the I & M canal.

The scourings, a foul black mass, poured into Lake Michigan and pushed out beyond the water intake stations. Death from the terrible diseases of polluted water was one byproduct of the storm. But the Metropolitan Sanitary District of Greater Chicago, destined to make the city the healthiest metropolis in the world, was another.

The flood's challenge came to a city with freshly healed scars from the great fire, a city struggling to build its roads and other public utilities as it scrambled for a place in the sun. And once again the challenge struck a spark.

Within days after the flood, a commission was appointed and a study was started to work out a plan which would protect the water supply—Chicago's most precious asset—forever.

In essence, the plan developed was simple:

Push the Des Plaines River to the west side of its valley. Dig a new drainage canal from the Chicago River at Robey Street to the Des Plaines River at Lockport, 28 miles of new canal, much of it through solid rock.

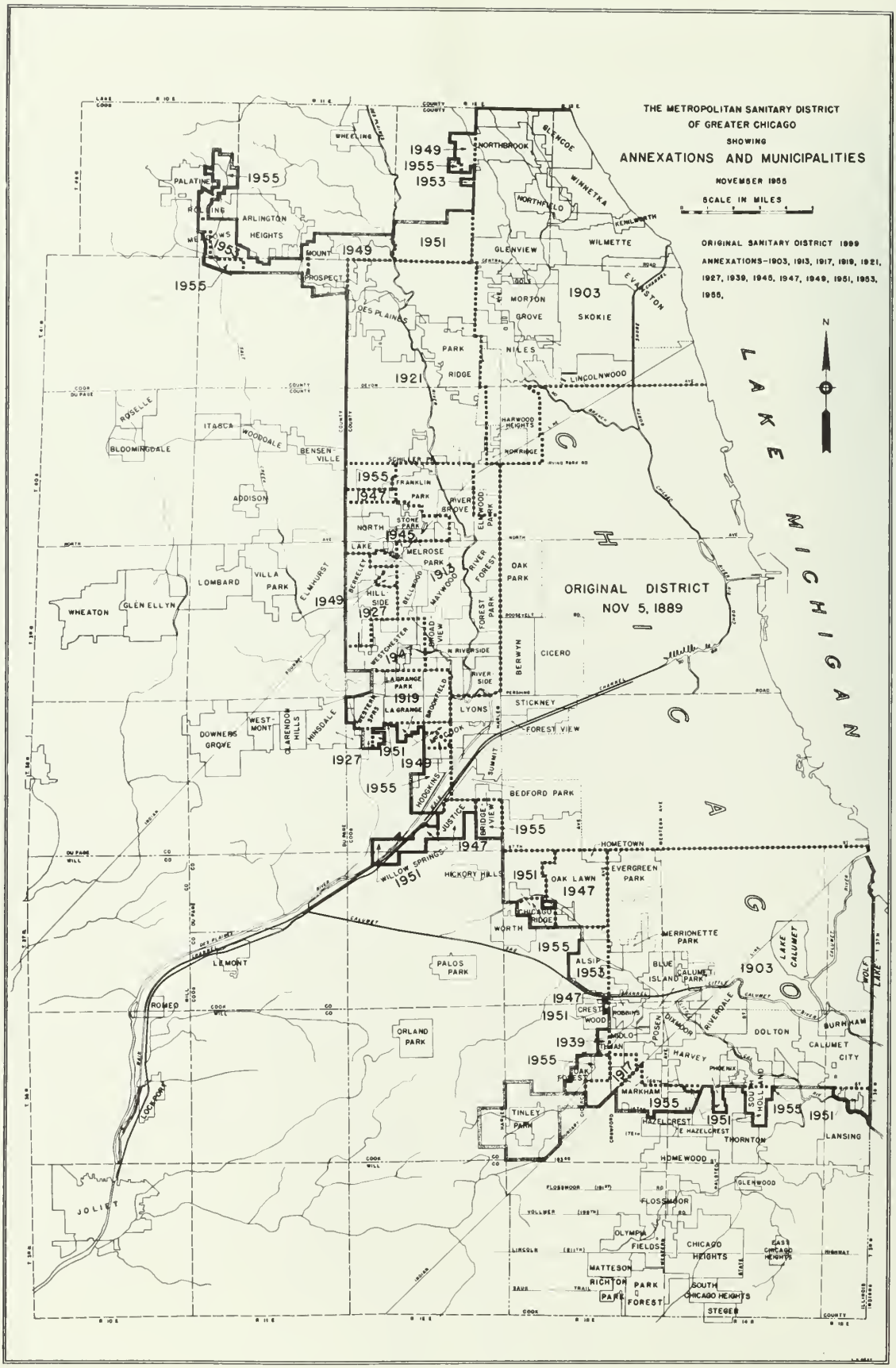
Make the Chicago River and the new canal flow away from the lake. Build intercepting sewers along the lakefront designed to carry their load into the drainage canal.

It was a task for giants.

By July 1, 1889, the plans had been completed and an act had been passed by the state legislature authorizing the creation of Sanitary Districts. These new governmental bodies were charged with protecting water supplies and were given the powers of taxing, policing, and eminent domain (i.e., the right to condemn property needed to fulfill governmental responsibilities).

By August 15, 1889, a petition to organize The Metropolitan Sanitary District of Greater Chicago (then "The Sanitary District of Chicago") had been submitted to the legislature, the outlines were fixed, and on November 5, 1889, the voters approved the project by a vote of 70,958 to 242.

The organization of The Metropolitan Sanitary District of Greater Chicago was completed on January 18, 1890. At that time the population within the boundaries was approximately one million and growing rapidly.



Growth of The Metropolitan Sanitary District of Greater Chicago.

2. the answer

1. A METROPOLITAN GOVERNMENT

From its beginning, The Metropolitan Sanitary District of Greater Chicago was an experiment in government and represented one of the first attempts in this country to form a functional service government to cope with the common and specific problems of a metropolitan area.

In this case the specific problem was the protection of the common water supply—Lake Michigan. The size of the task and the widespread benefits to be reaped called for a wide base cutting across the lines of many political subdivisions.

Within the boundaries of the District in 1889 were 185 square miles, including the City of Chicago, Oak Park, Cicero, Berwyn, Stickney, and part of Lyons Township.

In 1903 the territory within the District boundary totalled 358.1 square miles including the North Shore suburbs and the Lake Calumet region; and by 1913 the area served was 386.2 square miles, including suburbs in Leyden and Proviso townships.

In 1955, the territory served by the Sanitary District totalled more than 500 square miles, including the City of Chicago and 85 suburbs—approximately 50 per cent of the area of Cook County and about 95 per cent of the county's population.

The act provided the District would be governed by nine Trustees, three to be elected at large every two years for six year terms; a board of nine, the proponents of the legislation argued, would be large enough to insure representation throughout the District and yet not so large as to be unwieldy.

And from its start, irrespective of the political party in control, the makeup of the Board of Trustees has reflected faithfully the relative populations of the City of Chicago and the suburbs.

The Act further provided that the City of Chicago must provide water at its limits and at a cost not exceeding that charged comparable users in Chicago to any suburb within the boundaries of the Sanitary District.

Thus the groundwork was laid in 1889 for the District's direct interest in four major problems of the Greater Chicago metropolitan area:

1. SANITATION—the collection and disposal of all domestic and industrial wastes.
2. STORM FLOW—its waterways would carry the runoff from storms.
3. NAVIGATION—its canals would become the primary link in the inland waterway serving mid-America.
4. WATER—its first responsibility was to protect the water supply from pollution; and its member suburbs were entitled to water from the City of Chicago.

While most of these problems, in certain measure at least, would not demand solution on a metropolitan basis for another sixty years, the problem of sanitation would not wait.

The time had come to start moving earth.

2. MOVING EARTH

A. Sanitary and Ship Canal

The engineers who had conceived, studied and recommended the huge task included a committee which issued a report in 1885 and counted among its members Lyman E. Cooley, an eminent hydraulic engineer, and the Drainage and Water Supply Commission, appointed in 1886, and composed of Rudolf Hering, Chief Engineer, and Benezette Williams and Samuel Artingstall, Consulting Engineers.

The first Board of Trustees hustled through the planning stages. They were quite literally racing with death.

During the decade of 1881-1890, the community had a typhoid death rate of 67.5 per 100,000 population—a markedly high toll when compared with other cities having a relatively pure water supply.

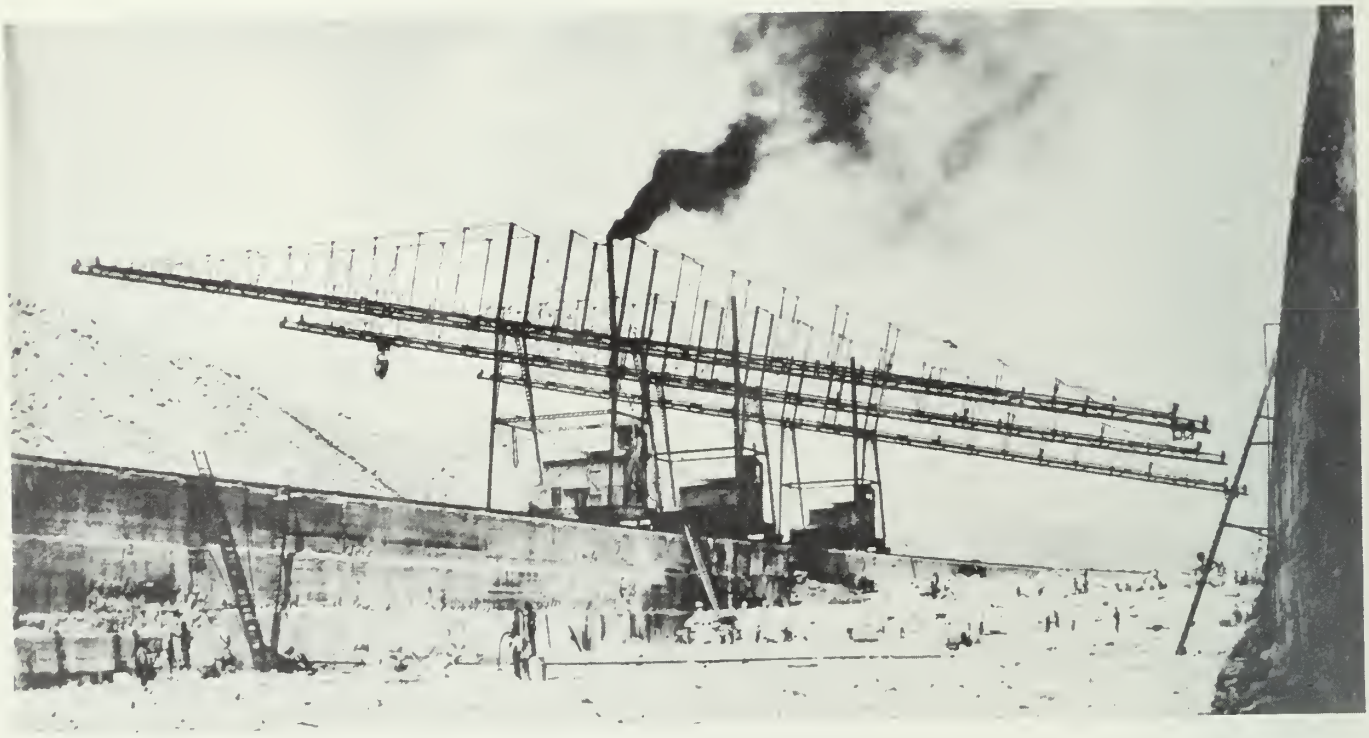
In 1891, even as the Board of Trustees was preparing the specifications for the canal, the typhoid death curve soared to 174 deaths per 100,000 population and the epidemic extended into 1892.

On September 3, 1892, the first shovel of dirt was dug. A working force of 8,500 men swung into action. Eight years were to pass before the job was done—eight years in which they would dig out 29,558,000 cubic yards of earth, and cut and blast 12,261,000 cubic yards of rock.

There were those who said it couldn't be done.

But the engineers, the contractors, and the swarms of workers—most of them newly arrived immigrants—went ahead with the job, undaunted.

"moving earth"...



Cantilever conveyors—Main Channel.

New road grader—about 12 horsepower—Main Channel.

"moving earth"...

Blasting out Main Channel.

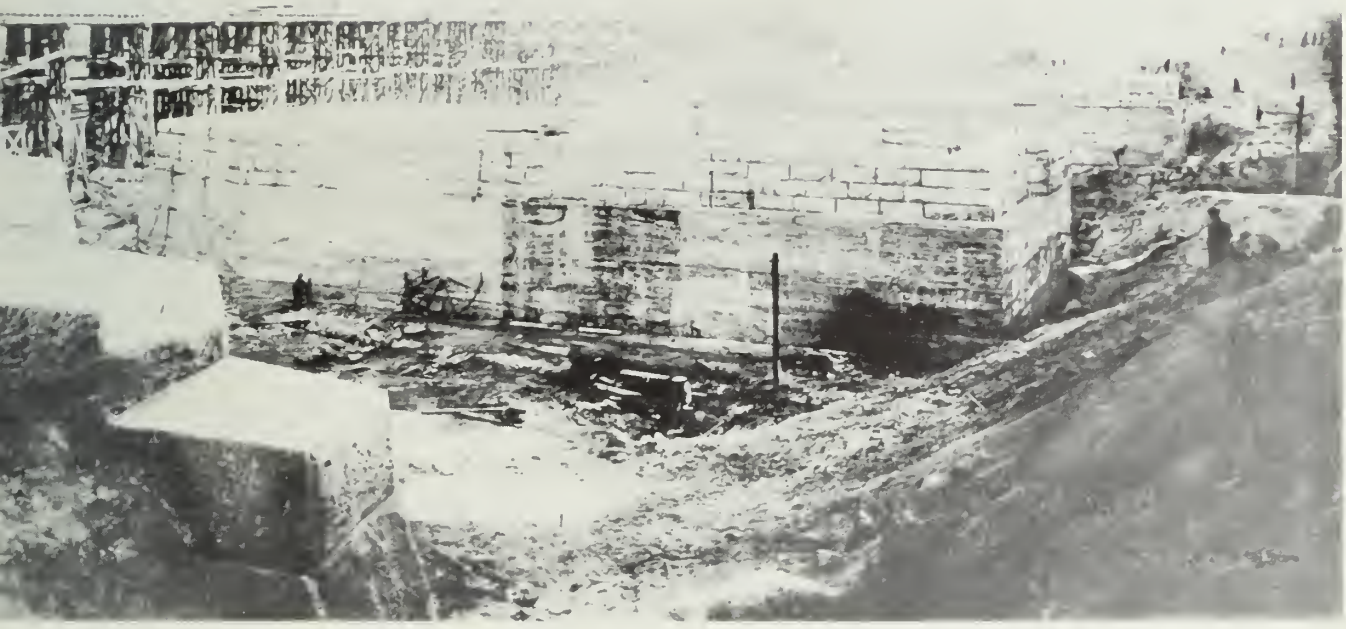
Earth slide, Sept. 24, 1896—Main Channel.

"moving earth"...

Junction of earth and rock sections at Willow Springs—Main Channel.

Excavating rock—Main Channel.

"moving earth"...

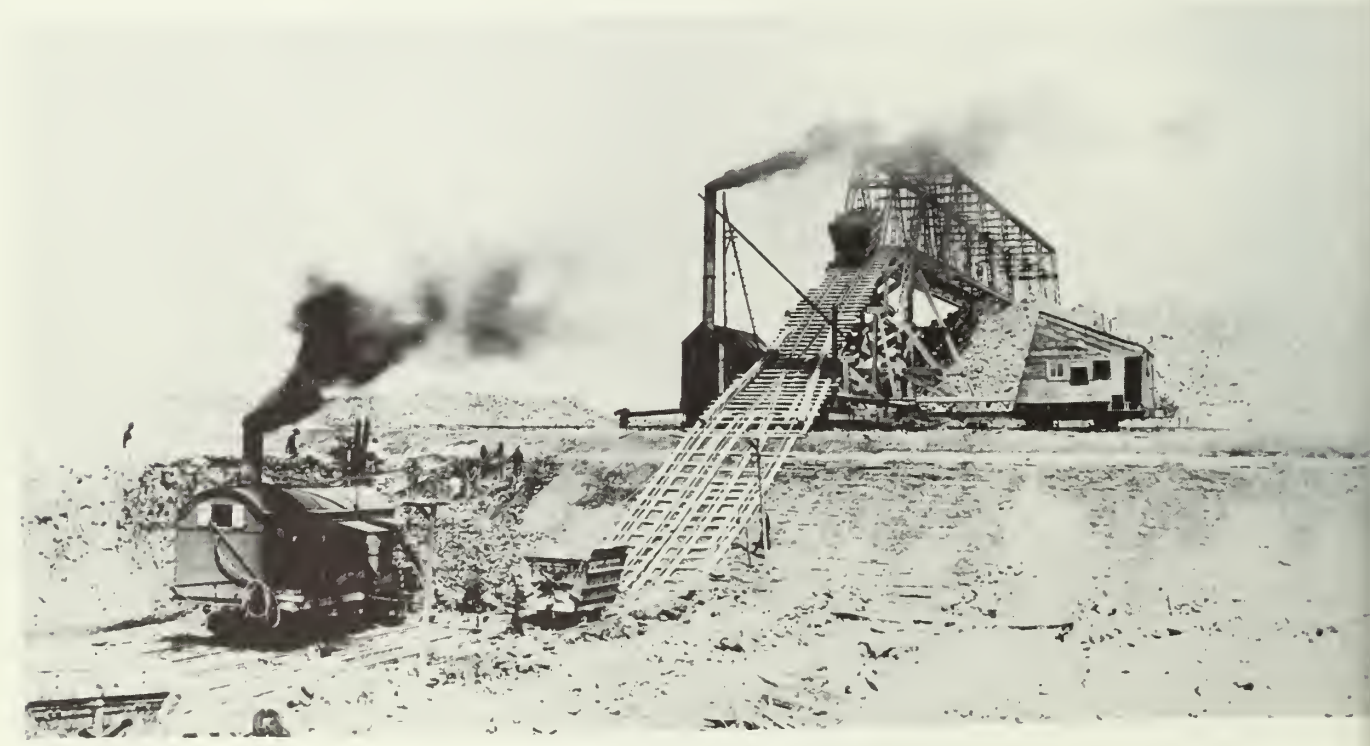


Foundations of railroad bridge over Main Channel near Western Av., Jan. 5, 1900.

Widening South Branch of Chicago River at Jackson St.

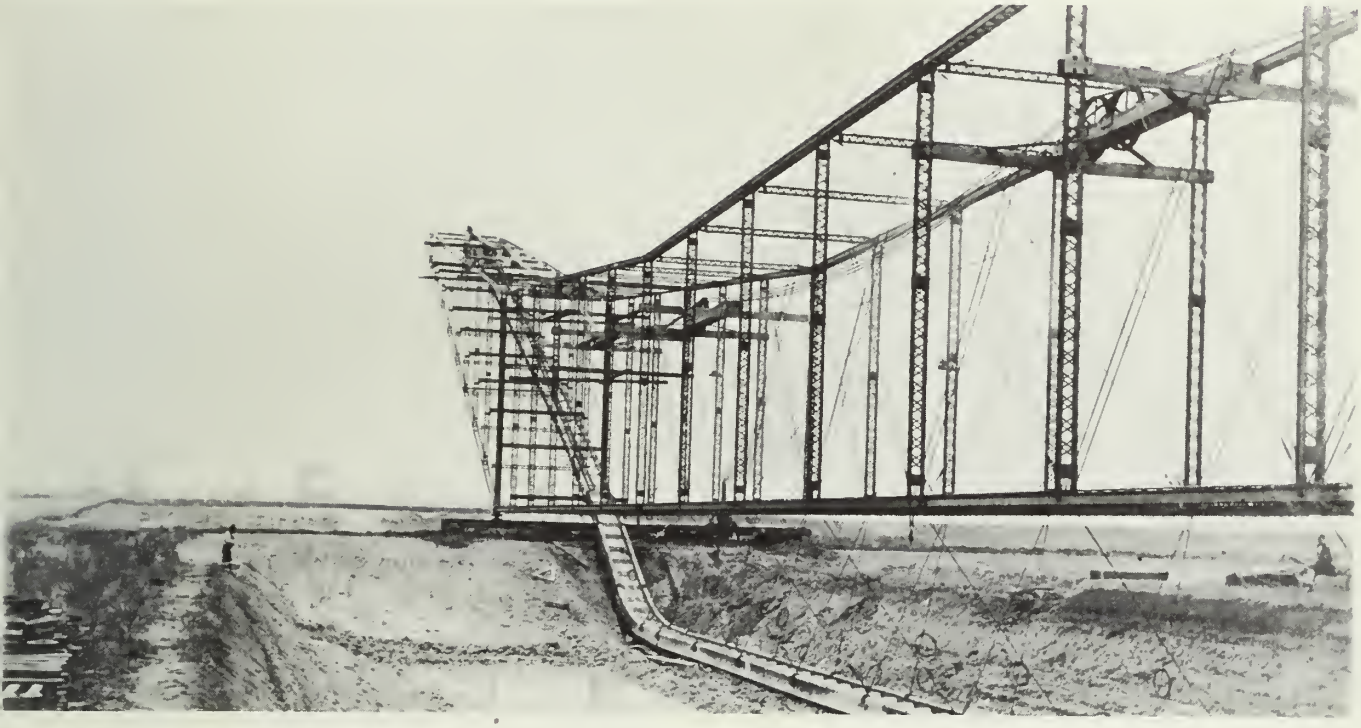
"moving earth"...

Tipple incline machine—Main Channel.



Two car incline—Main Channel.

"moving earth"...

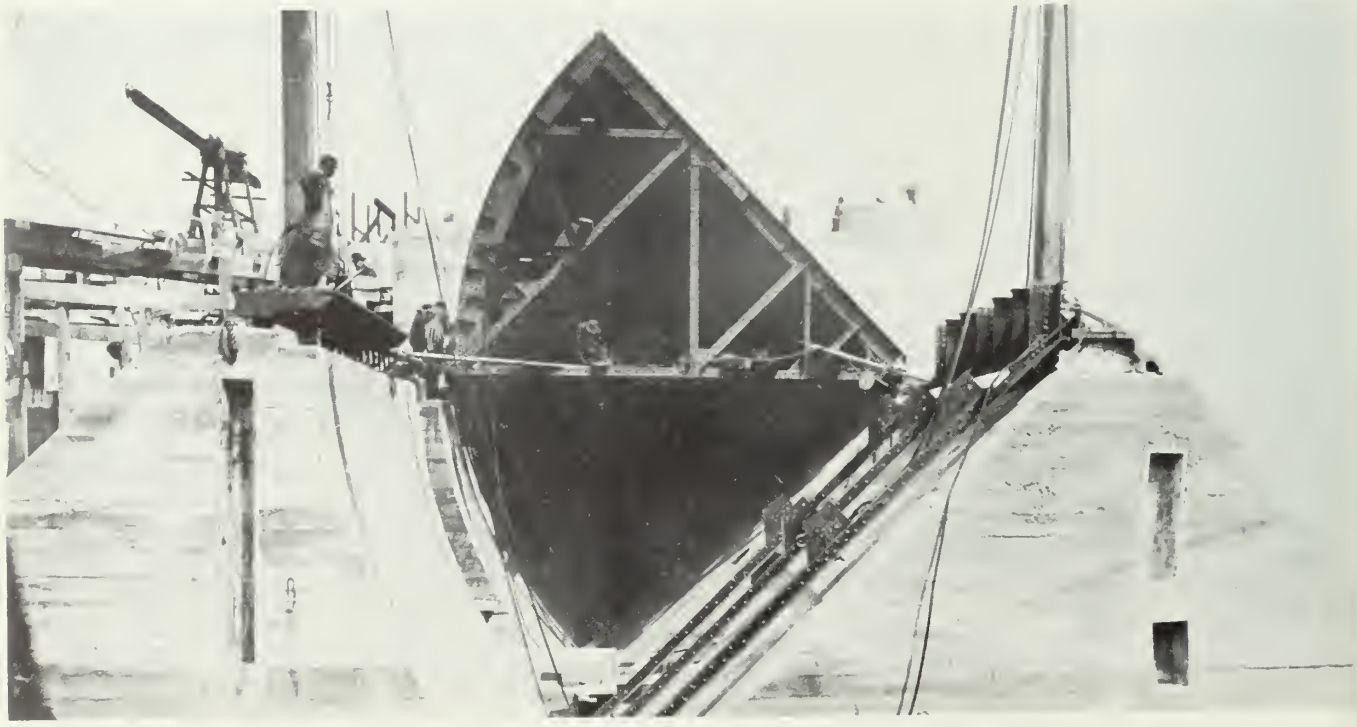


Belt conveyor—Main Channel.

Excavating for power house at end of Main Channel— Lockport.

"moving earth"...

Building controlling works—Lockport.



Famous Bear Trap Dam—Lockport.

2. the answer—cont'd.

They used every known type of earth and rock moving machinery then known—wheelbarrows, mule drawn plows and scrapers, steam shovels, steam dredges, drag scrapers and cableways, rock drills and channelling machines, liberal shots of dynamite, and their hands.

The men worked a 10 hour day. The laborers and teamsters were paid from 15 to 17.5 cents per hour. Drillers and trainmen were paid 17.5 to 20 cents per hour, carpenters 20 to 22.5 cents, machinists 20 to 25 cents, and boilermakers and stonemasons, 35 to 40 cents per hour. And overtime was paid on the straight hourly basis.

When every known method of moving earth failed or was too slow, the engineers and the men evolved new machines, new methods.

The canal became known throughout the engineering world as the "Chicago school of earth moving", and the machines and techniques developed on the job made feasible the digging of the Panama Canal.

The 28 mile Sanitary and Ship Canal was dug to provide a minimum depth of 24 feet, compared with the average depth of the old I & M canal (long abandoned now and soon to become a superhighway) of about six feet.

The excavation problem was divided roughly into three parts: a stretch of 7.8 miles from Robey street to Summit in solid earth; from Summit to Willow Springs through earth over a rock base; and from Willow Springs to Lockport through solid rock.

On the bottom the canal was cut a minimum of 160 feet wide with sloping sides through the earth sections. The downgrade from Chicago to Lockport varied from one foot in 40,000 in the earth sections to one foot in 20,000 through the rock

It was designed to carry a normal flow of up to 10,000 cubic feet per second without setting up a current of more than one and one-half miles per hour which would hamper navigation.

Despite cave-ins, earth slides, muck bubbles, and vast layers of a clay which combined the hardness of rock and the adhesive qualities of glue, the work forged ahead.

Late in December, 1899, with the end of the mammoth task in sight, the Board of Trustees learned that the State of Missouri had decided to seek an injunction in Federal Court to prevent the opening of the Canal.

The Missouri objection centered chiefly around the contention of St. Louis that the proposed dilution system of sewage treatment at Chicago would flush the wastes into the Mississippi River and imperil the St. Louis water supply.

The Board of Trustees regarded such an argument as academic. Reasoning that once started the flow would be hard to stop, the Board quietly ordered a needle dam knocked out on January 2, 1900, which turned the waters of the Chicago River into the channel.

Jan. 2, 1900: Needle dam between Chicago River and Main Channel is opened; water of Lake Michigan flows into Channel.

On the night of January 16, 1900, the Board went to Lockport and early the next morning—minutes before the suit for injunction was filed in the United States Supreme Court—the controlling gates were lowered and the water from Lake Michigan flowed toward the Mississippi.

B. The Interceptors

The second step in the program to seal off all wastes from Lake Michigan was to dig huge underground intercepting sewers along the lake front.

View of an interceptor serving the Chicago metropolitan area.

These were completed in 1907.

Those on the North Side converge at the Lawrence Avenue pumping station. Those on the South Side converge at the Racine Avenue pumping station.

The giant tubes, ranging from six feet to 27 feet in diameter, connect to the street and feeder lines which in turn connect with the individual house and factory lines.

C. The North Shore Channel

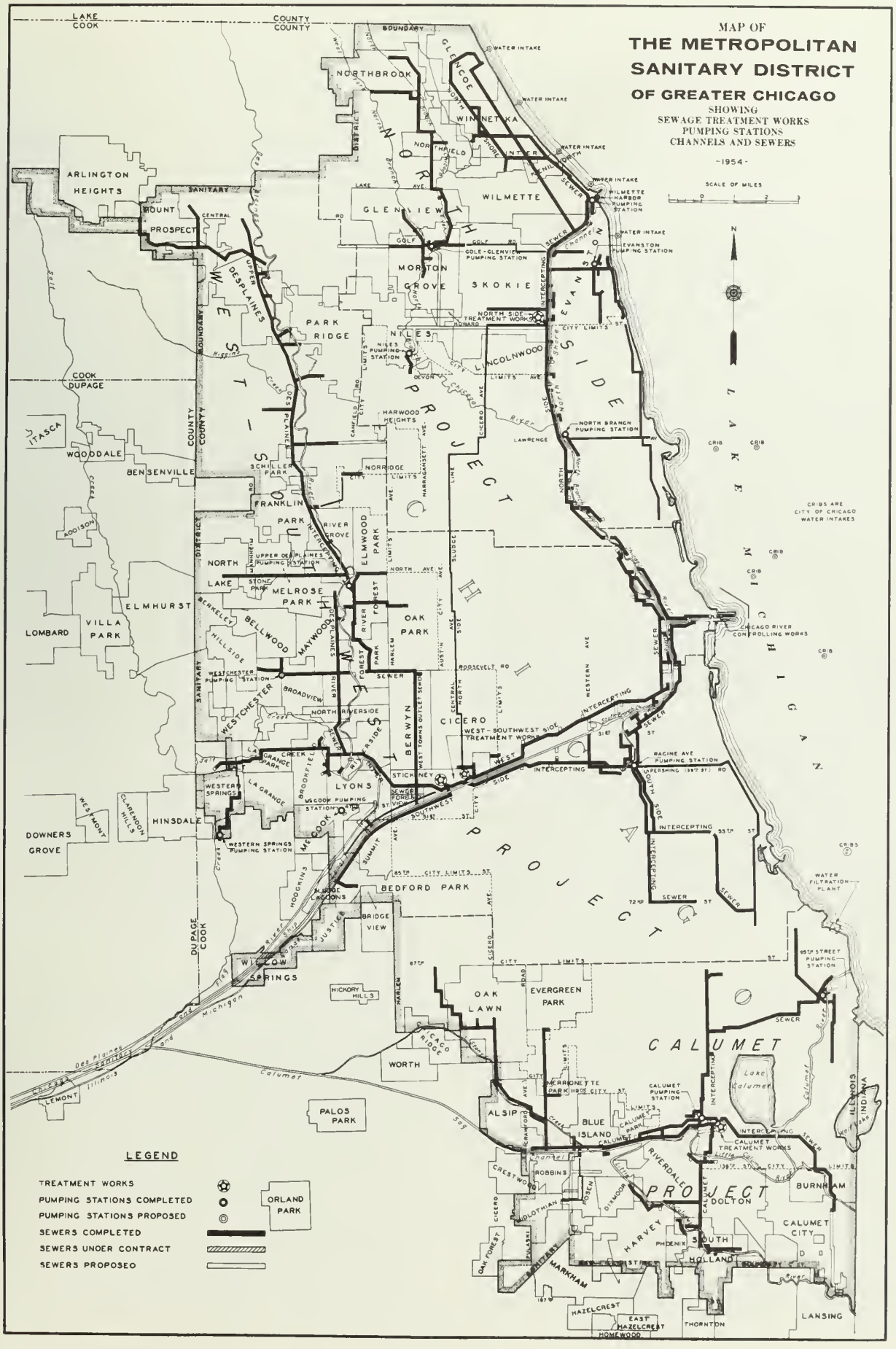
Simultaneously with the work on the interceptors, the Sanitary District went ahead with the planning and digging of the eight mile long North Shore Channel, extending from Lake Michigan at Wilmette to the North Branch of the Chicago River at Lawrence Avenue.

Work was started in 1908 and completed in 1910.

North branch of Chicago River at Wilson Av. at turn of the century.

The Channel was wide enough and deep enough to accommodate barge traffic. However, in recent years it has been seldom used for such purposes. It still serves as an outlet for flood water, and for the effluent from the North Side Treatment Works.

Nov. 29, 1910: Letting lake water into North Shore Channel.


MAP OF
THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
SHOWING
SEWAGE TREATMENT WORKS
PUMPING STATIONS
CHANNELS AND SEWERS
-1954-
SCALE OF MILES
LEGEND
TREATMENT WORKS
PUMPING STATIONS COMPLETED
PUMPING STATIONS PROPOSED
SEWERS COMPLETED
SEWERS UNDER CONTRACT
SEWERS PROPOSED
ORLAND PARK
NORTHBROOK
WINNETKA
WILMETTE
GLENVIEW
MORTON GROVE
SKOKIE
EVANSTON
NILES
LINCOLNWOOD
PARK RIDGE
ARLINGTON HEIGHTS
MOUNT PROSPECT
HARWOOD HEIGHTS
NORRIDGE
SCHILLER PARK
FRANKLIN PARK
RIVER GROVE
ELMWOOD PARK
NORTH LAKE
MELROSE PARK
OAK PARK
ELMHURST
VILLA PARK
LOMBARD
BERWYN
CICERO
WESTCHESTER
BROADVIEW
NORTH RIVERSIDE
LYONS
BROOKFIELD
WESTERN SPRINGS
LA GRANGE
HINSDALE
DOWNERS GROVE
BEDFORD PARK
BRIDGEVIEW
WILLOW SPRINGS
HICKORY HILLS
OAK LAWN
EVERGREEN PARK
WORTH
PALOS PARK
ALSIP
BLUE ISLAND
CALUMET CITY
RIVERDALE
DOLTON
HARVEY
SOUTH HOLLAND
PHOENIX
THORNTON
LANSING
BURNHAM
MARKHAM
HAZELCREST
EAST HAZELCREST
HOMEWOOD
ROBBINS
CRESTWOOD
POSEN
OAK FOREST
LEMONT
BENSENVILLE
WOODDALE
ITASCA
ADDISON
LAKE MICHIGAN
CALUMET
LAKE CALUMET
CHICAGO RIVER CONTROLLING WORKS
WATER FILTRATION PLANT
CRIBS ARE CITY OF CHICAGO WATER INTAKES
NORTH SIDE TREATMENT WORKS
WEST-SOUTHWEST SIDE TREATMENT WORKS
CALUMET TREATMENT WORKS
WILMETTE HARBOR PUMPING STATION
EVANSTON PUMPING STATION
GOLF-GLENVIEW PUMPING STATION
NILES PUMPING STATION
NORTH BRANCH PUMPING STATION
UPPER DES PLAINES PUMPING STATION
WESTCHESTER PUMPING STATION
WESTERN SPRINGS PUMPING STATION
MCCOOK PUMPING STATION
RACINE AVE PUMPING STATION
95TH STREET PUMPING STATION
CALUMET PUMPING STATION
NORTH SIDE PROJECT
WEST SIDE PROJECT
SOUTH SIDE PROJECT
RIVERDALE PROJECT
CALUMET
LAKE MICHIGAN
COOK COUNTY
DUPAGE COUNTY
DES PLAINES RIVER
CHICAGO SANITARY AND SHIP CANAL
CALUMET RIVER
ILLINOIS
INDIANA

D. The Cal-Sag

Without a pause, the Sanitary District moved ahead on the last of its three great channels—the Calumet-Sag Canal, draining the South Side and extending 16.2 miles westward from the Little Calumet River, near Blue Island, to the Sanitary and Ship Canal at Sag.

Work was started in 1911 and completed in 1922. The cost was $14,291,500, including $11,945,600 for channel work; $565,800 for controlling works; $1,126,200 for bridges, and $653,900 for right-of-way.

Completion of the Cal-Sag brought the Sanitary District's total of navigable canals to 71 miles; and the total investment in the channels reached $100,000,000.

Just as the Main Channel was designed to reverse the flow of the Chicago River, so on a smaller scale was the Cal-Sag to reverse the flow of the Calumet River and prevent the pollution of Lake Michigan.

West gates of lock at Cal-Sag controlling station.

The Cal-Sag Channel is 20 feet deep and 60 feet wide in the rock sections at either end and with a bottom width of 36 feet in the center section cut through earth. A total of 13,800,000 cubic yards of spoil was moved to build it, including 10,300,000 cubic yards of earth, and 3,500,000 cubic yards of rock.

The Cal-Sag immediately became a strategic link in the inland waterway system. Despite its narrowness, in recent years it has carried upwards of 4,000,000 tons of freight per year.

The completion of the St. Lawrence Seaway project, scheduled for 1959, and the construction of a barge terminal in Lake Calumet, now under way by the Chicago Port Authority, have heightened interest in widening the Cal-Sag.

This widening would serve two purposes: it would increase the flow capacity of the channel and relieve flood pressures on much of the South Side, and it would greatly increase the navigation capacity.

Sector gates on Cal-Sag Channel.

An initial appropriation by Congress of $4,000,000 permitted work to start on the widening in 1955. The canal will be widened to 225 feet throughout its length, a federal project with an estimated cost of $188,200,000.

To cooperate with this project which will widen the industrial horizons of the metropolitan area, the Sanitary District—in addition to providing the original canal—has agreed to purchase additional land along the channel for use as a spoil bank at a cost of $600,000.

3. LAKE DIVERSION

The diversion of water from Lake Michigan into and through the Main Channel at Lockport has been an almost constant bone of contention between Illinois and the other Great Lake states.

Historically, the Sanitary District based its right to divert water from the lake on a permit from the Secretary of War, issued on May 8, 1899.

The entire collection and disposal system was based on the dilution of all wastes by the diversion of three and one-third cubic second feet of fresh water for each 1,000 of population.

The field of Sanitary Engineering at the turn of the century was still in knee pants throughout the world and the dilution method of disposal was an accepted practice.

2. the answer—cont'd.

Since the Main Channel had been designed with a normal flow capacity of 10,000 cubic second feet, it was believed in those early days that the method would work successfully until the Chicago area population reached 3,000,000.

The first attack came on January 17, 1900—the day the gates were opened at Lockport—when the State of Missouri petitioned the United States Supreme Court to enjoin the discharge of sewage into the drainage canal.

Missouri charged that typhoid germs introduced into the channel at Chicago were carried 387 miles down the waterway system to pollute the water supply of St. Louis.

The Court dismissed the suit without prejudice on February 19, 1906, and it was never reopened.

Requests by the Sanitary District to increase the diversion rate beyond the 4,167 cubic feet per second authorized by the Secretary of War were denied and the Secretary subsequently filed suit to restrain the District from taking more water.

These suits were filed in 1908 and 1912, were consolidated for trial, and on June 18, 1923, the federal court sustained the Secretary. This decision was confirmed by the U. S. Supreme Court in 1925.

Meanwhile, it was apparent to certain far-sighted men—notably the late Col. Robert R. McCormick, who served as president of the Board from 1905-1910, and the late George M. Wisner, chief engineer—that alternative methods of supplementary artificial waste disposal must be found.

As early as 1909, testing stations were built and research was started on a practical and sanitary method of disposing of the area's wastes.

While this pioneering and research was going on, the other states on the Great Lakes banded together and brought suit in the U. S. Supreme Court to stop diversion. The suit was filed in 1922, amended in 1925 and again in 1926.

The Court handed down a decree on April 19, 1930, ordering the Sanitary District to reduce its diversion from the lake to 1,500 cubic feet per second, plus domestic pumpage, by December 31, 1938.

While the decree accelerated the research work, a depression and a war intervened to retard the building program.

Meanwhile, the Sanitary District had no choice but to comply with the diversion rate set in the Supreme Court decree. The canals and the waterway became increasingly foul and the ill effects spread downstream to the distress of communities further south.

By December, 1949, all of the wastes were being given complete treatment (see following chapter) and the Sanitary District renewed its efforts to secure an increase in the diversion rate in order to improve the condition of the waterway.

Since the Supreme Court had arbitrarily set the diversion rate at 1,500 cubic second feet, and so stated, and since the decree indicated any future relief should be obtained from Congress, legislation to that effect has been introduced at several sessions.

In 1954, Congress passed a bill permitting an increase of 1,000 cubic second feet. The measure was vetoed by the President.

The legislation was modified to answer the principal objections of its opponents and reintroduced in 1955 where it passed the House of Representatives. As currently (1956) pending before the Senate, the measure provides for an experimental increase of 1,000 cubic second feet for a period of three years under the supervision of the U. S. Army Corps of Engineers. The Corps is to make a study of the effect of the increased diversion on lake levels, navigation, and the condition of the waterways.

The Board of Trustees of The Metropolitan Sanitary District of Greater Chicago has gone on record as being willing to abide by whatever recommendation the Corps of Engineers may return.

3. world's finest treatment system

1. PIONEERING

Two factors loom large in the building of the world's finest treatment system: (1) the size of the task; and (2) the pioneering work which was needed at every step of the way, for this was a new and unique approach to the treatment and disposal of waste.

In regard to the first point, the following census figures show the population growth within the Sanitary District:

1890	1,114,000
1900	1,638,655
1910	2,308,276
1920	2,986,000
1930	3,901,569
1940	3,962,514
1950	4,338,958
1955 (est.)	4,600,000

Coupled with this growth in population was the rapid expansion of industry in the Chicago area and in 1955 these trade wastes—all of which were given complete treatment—added the equivalent of another 3,500,000 people.

Some idea of the magnitude of the operation may be gained from the engineering estimate that these domestic and industrial wastes, if allowed to accumulate, in one year would bury the entire City of Chicago nine feet deep!

The pioneering was carried out by one of the most renowned staffs of engineers ever assembled—men who came in answer to a challenge, dedicated their lives to the fight, and helped build one of the seven wonders of modern engineering.

Dr. Mohlman

They were such men as the late George M. Wisner and the late Philip Harrington, who served as chief engineers; and four men who are still with the Sanitary District, who have earned world-wide reputations with service records which total more than 175 years: General Superintendent William A. Dundas, Chief Engineer Horace P. Ramey, Sanitary Engineer Langdon Pearse, and Dr. F. W. Mohlman, Chemist.

Others who played important roles are retired Chief Engineer William H. Trinkaus; the late Hydraulic Engineer Louis W. Hall; and Norval E. Anderson, engineer of treatment plant design; Peter F. Girard, engineer of sewer design; John T. Hawley, electrical engineer; Principal Assistant Attorney Lawrence J. Fenlon; Senior Assistant Engineer Joseph Richmond;

Anderson

Girard

Arnold H. Goodman, engineer of plant operation; Richard F. Kelly, assistant chief engineer; Lawrence B. Barker, engineer of construction; Frank L. Finlayson, architect; Ralph R. Leffler, engineer of structural design; Carl P. McLaughlin, engineer of mechanical design; Edward J. Calta, departmental engineer; and Philip Furlong and Joseph Wade, of the general superintendent's staff.

Goodman

Kelly

The assignment handed these men and their coworkers was simple and clear:

1. Collect every bit of domestic and industrial waste originating within the boundaries of the Sanitary District

2. Develop a method of treating and disposing of these wastes.

3. Keep the costs within practical limits.

4. Do it all quickly.

There was only one catch: It had never been done on such large scale . . . but, then, the flow of the Chicago River hadn't been reversed by man either!

* * *

2. PLANTS AND METHODS

Today the Sanitary District has in operation three major treatment plants with a combined capacity of *one billion three hundred million gallons* per day. These plants, representing an investment of nearly $150,000,000 are:

North Side Works completed in 1928 and expanded in 1937.

Calumet Treatment Plant, completed in 1922 and expanded in 1935.

*West Side Works, completed in 1931.

*Southwest Treatment Plant, put into operation in 1939 and still in the process of expansion.

*(*Note: In 1949 the West and Southwest plants were combined into the Stickney Treatment Works, the largest in the world.)*

Primary settling tanks—North Side Treatment Plant.

Aerial view—Stickney Treatment Works.

The Calumet Treatment Plant.

Aeration tanks, Calumet Treatment Plant.

3. world's finest treatment system — cont'd.

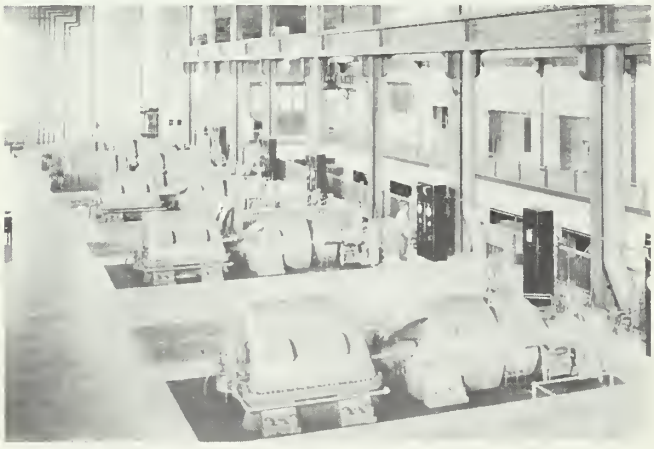
Almost 250 miles of giant intercepting sewers, costing about $170,000,000, feed the wastes of the area into these plants—wastes which average more than 1,100,000,000 gallons per day. Seventeen pumping stations, each with multiple pumps which dwarf the men who work on them, boost the flow at strategic points.

Simply put, the problem of sewage disposal is to separate the wastes from the water vehicle (called the effluent) and then dispose of these wastes in some unobjectionable manner.

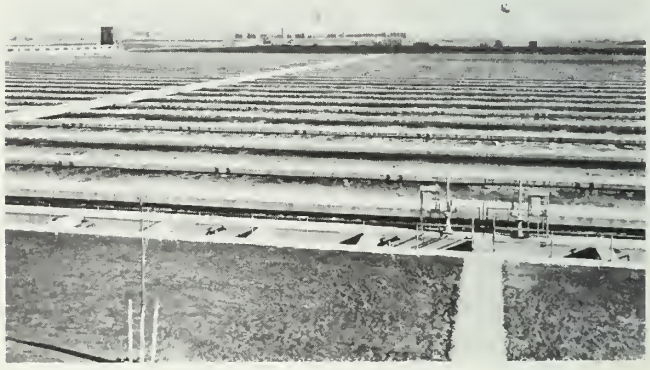
The first major experimental plant—a laboratory, so as to speak, for the testing of theory and design—was built in Maywood in 1921.

The lessons learned in that first small plant provided the basic pattern for the three existing plants; and indeed, a pattern for modern sewage disposal plants throughout the world.

It was Chemist John R. Palmer, working with Dr. Mohlman, who in 1925 discovered the value of ferric chloride as a practical coagulant in the treatment process. It was Chief Engineer Harrington and the then Chief Mechanical Engineer Dundas who developed the "flash-drying" process of sludge disposal in a five year study from 1931-1936.



Main floor pump and blower house—Stickney Treatment Works.



Aeration tanks—Stickney Treatment Works.

Final settling tanks—Stickney Treatment Works.

Effluent weirs, aeration tanks, Stickney Treatment Works.

3. world's finest treatment system — cont'd.

It was the entire team, working night and day, which adapted the activated sludge process to meet the titanic and varying requirements of the area.

Such problems had to be solved as: What size air bubbles should be pumped into the aeration tanks? How clean must the pumped air be and what filters could best produce it? What quantity of ferric chloride would best do the job? What type of fabric blankets would produce the best results on the giant drum filters?

Those and a thousand other questions were answered and the results may be seen in the Stickney Treatment Works (guided tours may be arranged by appointment)—a tremendous plant, kept spotlessly clean and free of offensive odor.

The step-by-step process follows:

Incoming wastes enter the plant through 2-inch bar screens with automatic cleaners which remove the large debris. The screenings are ground in hammer mills and pumped back into the sewage lines.

The wastes then enter the preliminary settling tanks. Each of these is 101 feet by 103 feet and 11 feet deep. Each is equipped with six horizontal flight sludge conveyors and two cross conveyors to the sludge hopper. Any given gallon of waste is detained in the preliminary tank for about 30 minutes. The settled sludge is drawn off the bottom.

The sewage-laden water then flows into the aeration tanks, each tank consisting of four channels 434 feet long, 34 feet wide, and 15½ feet deep. Filtered air under a pressure of 8½ pounds per square inch is pumped through the liquid by steam turbine-driven blowers developing a total of 27,000 horsepower.

At this point, bacteria-laden sludge from previous batches is "seeded" into the fresh wastes—the activated sludge process. Given the right temperatures and the correct supply of air, these bacteria multiply thousands of times and aid materially in the digestion process during the three to four hours the wastes are held in these tanks.

From the aeration tanks, the wastes flow into the final settling tanks, each 126 feet in diameter with a bottom slope to a sludge draw-off pipe in the center. The sludge is drawn off and moves to the sludge control building.

The effluent—a clear, odorless liquid, from which more than 90 per cent of the solids have been removed—is pumped into the Sanitary and Ship Canal. (Those impurities still in the effluent are microscopic particles in suspension.)

The sludge, meanwhile, has flowed into a concentration tank. These tanks are 70 feet long, 46 feet 9 inches wide, and 14 feet deep. The sludge remains in them for 4½ hours, the excess liquid being returned to the incoming sewage.

After the concentration tanks, the sludge is dosed with $Fe\ Cl_3$ (ferric chloride) and then flows to the vacuum filters. Each filter is 11 feet 6 inches in diameter, 16 feet long, and has a net filtering area of 570 square feet.

Huge sludge filter drums—Stickney Treatment Works.

These giant drums are covered with dacron blankets. The moisture is drawn through the blanket and a fixed blade strips the sludge-cake from the blanket and drops it into a conveyor belt.

The conveyor carries the filtered sludge-cake into one of the flash-drying units, each having the capacity to evaporate 25,000 pounds of water per hour by using a blend of combustion gases and sludge vapor at 1,300 degrees F.

Since activated sludge is about 98 per cent water and an acceptable commercial fertilizer should not contain more than 5 per cent moisture, it is necessary to remove 98,000 pounds of water to manufacture one ton of fertilizer.

This one plant of the Sanitary District produces more than 600 tons of high grade fertilizer per day—an organic product, free of harmful bacteria, which returns more than $2,000,000 per year in revenue for the District.

With the development of this process, mankind had mastered a method to complete nature's cycle and return the growth factors to the soil without fear of contamination or disease . . . and to do it on a scale that roused the wonder and admiration of the scientific world.

* * *

3. SEVEN MODERN WONDERS NAMED

Generally and naturally, the people served by the Sanitary District took its accomplishments in stride. The system worked . . . true, the reversal of the Chicago River was dramatic, but it was done so long ago . . . and hasn't every city a sanitary system?

Late in 1955, the American Society of Civil Engineers pleasantly startled the residents of the Chicago Metropolitan area: The Metropolitan Sanitary District of Greater Chicago had been selected—on two counts—as one of the seven engineering wonders of the United States!

The wonders as listed by the Society after several years of consideration by its membership were:

1. Chicago's Sewage Disposal System, a Herculean Task in Sanitation.
2. Colorado River Aqueduct, Longest Man-Made Conduit.
3. Empire State Building, Queen of Skyscrapers.
4. Grand Coulee Dam and the Columbia Basin Project, Irrigation Marvel.
5. Hoover Dam, World's Highest Dam.
6. Panama Canal, a Cut Linking Two Oceans.
7. San Francisco-Oakland Bay Bridge, 'Unique Over-Water Steel Structure.

An ancient historian, one Antipater of Sidon, named the seven wonders of the ancient world: the pyramids of Egypt; the Gardens of Semiramis at Babylon; the statue of Zeus at Olympia; the Temple of Artemis at Ephesus; The Mausoleum at Halicarnassus; the Colossus of Rhodes; and the Pharos of Alexandria.

In an article in the November, 1955, issue of CIVIL ENGINEERING, the organ of the American Society of Civil Engineers, Chairman J. Kip Finch of the committee which made the selections cited the reversal of the Chicago River and the Southwest Treatment Works as outstanding accomplishments.

His article said in respect to the sanitation requirements of modern urban centers that the Chicago area "is outstanding in meeting the challenge successfully."

Speaking of the U. S. Supreme Court directive to build treatment plants and reduce lake diversion, Dean Finch said: "It is doubtful whether any city in the world has ever faced a more herculean task, yet the necessary plants were built . . ."

The selections drew national attention, including articles in READER'S DIGEST and TIME MAGAZINE, and local television and radio stations, and newspapers gave the honor full play.

Empire State Building

Hoover Dam

San Francisco-Oakland Bay Bridge

Main plant—Stickney Treatment Works

Grand Coulee Dam

Panama Canal

Colorado River Aqueduct

4. administration

1. BOARD OF TRUSTEES

A. Powers

The affairs of The Metropolitan Sanitary District of Greater Chicago are administered by a board of nine Trustees elected at-large from the area served.

As previously noted, three Trustees are elected at every general election (every two years) for six year terms. This serves to maintain a continuity of experience upon the board which is called on to make many decisions of a complicated and technical nature—decisions which may have a far-reaching effect upon the health and welfare of the metropolitan area.

The Board of Trustees elects from its membership a President and a Vice President. The President has the power of veto over the ordinances passed by the board.

The Board has the statutory power to appoint, supervise and remove the General Superintendent, the Chief Attorney, the Chief Engineer, the Clerk, and the Treasurer. In addition, the Board of Trustees appoints the members of the three-man Civil Service Board.

All of the affairs of the District move to the Board of Trustees for decision through the committee system such as that in use in the state legislature and in congress, except that in this instance, each Trustee is chairman of at least one committee and all of the Trustees are members of every committee.

B. Personalities

The men who presently (Spring, 1956) comprise the Board of Trustees are:

President Anthony Olis; born in Chicago in 1898, he received his Ph. B. degree from the University of Chicago in 1919 and his J. D. degree from the University of Chicago Law School in 1921. He served in The United States Navy in World War I. He has practiced law in Chicago since 1921; and was elected Trustee of the District in 1946, becoming president in 1950. He was re-elected in 1952. He is a member of the American and Chicago Bar Association, the American Legion, the South Shore Country Club and the Union League Club.

Vice Pres. William F. Patterson; born in Ohio in 1909, he has lived in Chicago since he was six. He attended Northwestern University, and De Paul and Loyola Law Schools, receiving his L.B. degree in 1934. With the exception of service with the U. S. Marine Corps in World War II, he since has practiced law in Chicago. He is vice president of the National Association of Claimants and Compensation Attorneys; a member of the Chicago, Illinois and American Bar Associations; the Shrine; Loyal Order of Moose; the American Legion; and the Executives Club of Chicago. He was elected Trustee in 1950 and was elected Vice President in 1954 following the death of Vice President Michael J. Rudnik.

Trustee Frank W. Chesrow; born in Chicago in 1903, Col. Chesrow has a degree in pharmacy from Valparaiso University, Indiana, and is the owner of a drug store chain. He is a world traveler and explorer; as a member of the General Staff, Allied Forces, served as liaison officer between the U.S. Military Mission in Italy and the Italian government in World War II; was decorated by the American, French and Italian governments; and currently as a colonel in the army reserve is assigned as chief of civil affairs and military government, 322nd logistic command, Chicago. He has been active in civic affairs and veterans' groups, and is a member of the following social clubs: Chicago Athletic Club, Adventurers' Club, South Shore Country Club, Chicago Drug Club, the Army and Navy Club, Reserve Officers Association, American Chemical Society, Military Engineers Association and many other groups. He was elected Trustee in 1948 and reelected in 1954.

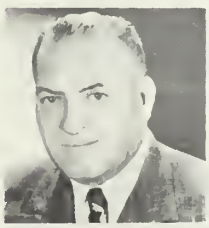
Trustee John A. Cullerton; born in Chicago in 1895, he attended Lewis Institute and De Paul University. In World War I he served with the Illinois 33rd Divison. He is secretary-treasurer of an engineering and construction firm and is

active in the Suburban Sanitary Improvement Association, the Metropolitan Administrative Study Committee, and the Chicago Metropolitan Home Builders Association. He served as trustee and president of the Village of Elmwood Park from 1932 until his election as Trustee of the Sanitary District in 1948. He was reelected in 1954. He is a member of the American Legion, Veterans of Foreign Wars, Disabled American Veterans, Knights of Columbus, Moose, Kiwanis, and Chamber of Commerce.

Trustee Francis T. Delaney; son of a Chicago policeman, he is a graduate of Loyola University schools of commerce and law. He is 45 years old and has been practicing law since 1937. He is a member of the Chicago, Illinois and American Bar Associations, the Catholic Lawyers Guild, and the Holy Name Society. He was appointed Trustee in September 1955 by the Governor to fill the vacancy left by the death of the late Vice President Michael J. Rudnik until the next general election.

Trustee Casimir Griglik; born in Poland in 1898, he came to the United States when he was seven. He served in the United States Army during World War I, graduated from Officers Training School, and became a citizen. A graduate of New York University, he was admitted to the Illinois bar in 1937 and since has practised law in Chicago. He is a master-in-chancery of the Superior court of Cook County and a member of the Governor's Committee on Metropolitan Water and Sanitation. He served as a government appeals agent, selective service, for eight years during and after World War II, and was awarded a citation and medal by Congress for his volunteer work. He is a member of the Chicago, Illinois and American Bar Associations, Advocates Society, American Judicature Society, the American Legion, the Polish National Alliance, the Polish Roman Catholic Union, Knights of Columbus, and numerous other social and fraternal groups. He is a member of the City Club of Chicago and the Elmhurst County Club, and a vice president and director of the Park National Bank of Chicago. He was elected Trustee in 1948 and reelected in 1954.

Trustee John G. Henneberger; born and educated in Chicago, he is 56 years old. He began working as clerk and joined the Boilermakers Union in 1918. He later was elected president of a United Steel Workers C.I.O. union. He is president of John G. Henneberger & Associates, industrial relations consultants. During World War II he was a member of the War Labor Standards Advisory Board. In 1945 he was appointed assistant state director of labor. He has taken an active interest in the civic and political affairs of the Southeast Side of Chicago. He is a member of South Chicago and East Side Chambers of Commerce, City Club of Chicago, Kiwanis, Lions, Loyal Order of Moose, Eagles, Dr. Abe Hyman Foundation, Germania Club, Steuben Society, Illinois Athletic Club, Royal Order of Boers, and Local 903, American Federation of State, County and Municipal Employees. He was elected Trustee in 1950.



Trustee J. B. Martin; born in Holly Springs, Mississippi, in 1888, he attended LeMoyne Institute in Memphis, Tennessee and Walton Unversity at Nashville. He received a degree in pharmacy at Meharry Pharmaceutical School and in 1910 opened the first of what became a chain of drug stores in Memphis. He and his family moved to Chicago in 1932 and he became president of the Negro American Baseball League. He is treasurer of the Victory Mutual Life Insurance Company, and a member of the Boys Club, the Elks, the YMCA, the Chicago Urban League, and Omega Psi Phi fraternity. He was elected Trustee in 1946 and reelected in 1952.

4. administration—cont'd.

Trustee William S. Nordburg; born in Chicago in 1887. He attended Evanston High School and Armour Institute of Technology, majoring in engineering and business administration. His early career was in banking and advertising. He was vice-president of William H. Rankin Company, advertising agency. He founded the Chicago Suburban Quality Group of weekly newspapers. He is co-founder, vice-president and director of the Evanston Federal Savings and Loan Association. He is president of the North Shore Sunday Evening Club, past-master and now treasurer of Winnetka Lodge No. 1078 A.F.&A.M.; member of Oriental Consistory (32nd degree Mason) and Medina Temple (Shrine). He is a Trustee and secretary of the Pension Board of the Metropolitan Sanitary District of Greater Chicago; co-chairman for Red Cross and Community Chest drives in the Sanitary District for the last eight years; a member of the Governor's Committee on Metropolitan Water and Sanitation, and the Illinois Athletic Club. He was a Lieutenant in the American Protective League under The Department of Justice, World War I. He was elected in 1946 to an unexpired term of four years and re-elected for a full term in 1950.

2. FINANCE

The Metropolitan Sanitary District as it stands today —canals, interceptors, plants and pumping stations— represents a total investment of approximately $420,000,000 or about $50 per capita on the basis of the sewage load it collects.

Almost three-fourths of this investment has already been paid by the taxpayers; the balance—the bonded debt of $110,000,000—is being reduced at the rate of about ten million dollars per year, since the District adopted a pay-as-you-go construction program in 1953.

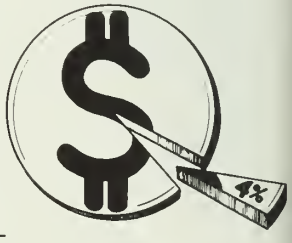
Most of the bonded debt was incurred through the issuance of non-referendum bonds under authority given by the state legislature in order for the District to comply with the U.S. Supreme Court mandate in the lake diversion case. The decree directed the District to construct adequate treatment plants.

The pay-as-you-go construction program—widely supported by civic groups and tax watchdog agencies —has the objective of making the District debt free by 1970. New construction is budgeted and paid for out of each year's tax levy.

It has been during the present administration (i.e., since 1950) that the second great construction phase of the District was completed: all of the plants were in full operation and providing full treatment of all domestic sewage and industrial wastes originating within its boundaries.

Operating economies were put into effect, ranging from the purchase of coal-by-barge to the use of dacron blankets on the filter drums; despite the rising costs of labor and materials, a total of nearly six million dollars ($5,877,000) was saved the taxpayers by reduced corporate expenditures from 1951 through 1954. (Subsequent budgets reflect the pay-as-you-go construction program.)

The operating costs of the District account for about four per cent of the aggregate tax bill paid by the taxpayer who is served by all six of the major taxing bodies of Cook County—the District, the County, Forest Preserve, City of Chicago, Board of Education, and Park District.



Since 1950 the district has increased substantially its revenues from the sale of commercial fertilizer. The following table shows the tonnage produced and the income derived:

	TONS	RECEIPTS
1950	57,045	789,612
1951	75,666	1,227,407
1952	82,191	1,465,210
1953	86,141	1,419,308
1954	114,536	1,781,501
1955	131,035	2,137,298

A research program at the University of Illinois, under the District's sponsorship, is under way to determin the nature of the growth factors found in this organic product and to find, if possible, a feasible method of extracting them, in order to provide additional revenue. The research also is to determine the relative values of organic fertilizer as opposed to the inorganics.

What does the service performed by the District—the protection of Lake Michigan from pollution, the collection and treatment and disposal of all wastes—cost the individual taxpayer?

The District budget for 1956 was:

Bond and Interest	$ 14,021,230.95
Annuity and Benefit	970,000.00
Corporate	19,500,000.00
New Construction (pay-as-you-go)	9,200,000.00

Because the District is on a pay-as-you-go basis for new construction, the bond and interest levy will fully pay the District's bonded indebtedness by 1970 and this levy should not be a recurring item. And so, for operation and maintenance (corporate budget), for new construction (pay-as-you-go), and for pension purposes (annuity and benefit), the total District levy for 1956 was $29,600,000.

At present the District is handling the wastes of a population equivalent of 8,000,000 people. On a per capita basis—valid since industry pays its full share of the bill—the cost is about $3.70 per person per year, for this service, including the cost of new construction.

3. DEPARTMENT HEADS

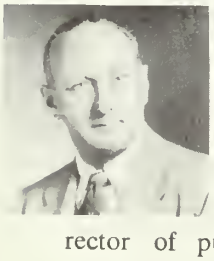
The department heads of The Metropolitan Sanitary District, who translate the policies and legislation of the Board of Trustees into the day-by-day operations of the 1,900 employees, are:

General Superintendent Dundas

General Superintendent William Alfred Dundas; born in Ashland, Wisconsin, in 1893, he attended Northern State Normal College and the Carnegie Institute of Technology. He served in the chemical warfare division of the United States Army in World War I and was employed by the District in 1919 as an assistant mechanical engineer. He became Chief Mechanical Engineer and Engineer of Mechanical Design in 1930—the start of the period during which he helped invent the flash-drying process. He became head of maintenance and operations in 1941 and was appointed General Superintendent in 1947. He is a member of the American Society of Mechanical Engineers, The Governor's Committee on Metropolitan Water and Sanitation, the Adventurers Club, the Union League Club, and the American Legion.

Chief Engineer Ramey

Chief Engineer Horace P. Ramey; born in Wise, Virginia, he graduated from the University of Michigan in 1907 with a B.S. degree in Civil Engineering; and received the degree of Civil Engineering in 1917. He was employed by the District in 1907 and has served as rodman, computer, junior engineer, resident engineer, assistant engineer, senior assistant engineer, assistant chief engineer and acting chief engineer. He was named Chief Engineer in 1954 following the retirement of Chief Engineer William H. Trinkaus. He is a world wide authority on sanitary plant and sewer construction; as well as hydraulics and the physical nature of the Great Lakes. He is a life member of the American Society of Civil Engineers and the Western Society of Engineers, a life member of the Shrine, and a member of the Chicago Athletic Club, the Chicago Engineers Club, and Olympia Fields Country Club. He is a member of Tau Beta Pi, and Sigma Xi.



Clerk Harry Edward Eaton; born in Manila, Philippine Islands, in 1904, he attended the University of Nebraska and Georgia School of Technology, receiving a B.S. degree in electrical engineering. After a wide experience, including director of purchases for Whiting Corporation, Harvey, Ill., he was appointed Clerk of the Board and director of purchases for the District in 1951. He is a member of the National Association of Purchasing Agents, National Institute of Governmental Purchasing, Beta Theta Pi, Pi Delta Epsilon, Kappa Eta Kappa. He is a member of the Lake Shore and Union League Clubs of Chicago and the Calumet Country Club.

Chief Attorney Russell W. Root; born in Diamond, Ill., in 1898, he graduated from the University of Illinois Law School in 1922 and was admitted to the Illinois bar. He served as a second lieutenant, infantry, in World War I. He has served as an assistant state's attorney of Cook County, assistant attorney with the State Auditor, chief hearing officer of the state department of revenue, assistant state treasurer, and chief attorney for the Forest Preserve District. He was appointed chief attorney of The Metropolitan Sanitary District in 1950. He is a member of the American and Chicago Bar Associations, the South Shore Chamber of Commerce, Medinah Temple, and the South Side Swedish Club. He has been prominent in American Legion activities.

Treasurer Weymouth S. Kirkland; born in Chicago in 1919, he attended Hodgekiss School, Lakeville, Conn., graduated from Princeton University in 1940, and attended Harvard Law School until he entered the United States Navy in 1941. He served throughout World War II. He is Assistant Vice President of the American National Bank and Trust Company of Chicago and was appointed treasurer of the District in 1950.

Real Estate Manager Earl Derx; born in Chicago in 1897 he was educated in Chicago public schools and entered the field of business upon his graduation from High School. His wide experience included home construction and real estate. He was appointed assistant real estate manager in 1950 and became manager in 1954.

4. CIVIL SERVICE BOARD

In 1951, the Trustees of the District backed legislation to set up a model civil service act designed to remove as far as possible the political patronage aspect of employment in the District. The measure was supported by civic agencies and became law, replacing the original civil service act of 1935.

Under the new act the Board of Trustees appointed a three man civil service board serving overlapping terms. None of the three were to have participated actively in politics for a period of two years prior to appointment, according to the act. They are removable only for cause and they cannot represent only one party.

The administrative officer of the civil service board, the Supervisor of Employment, was appointed by the civil service board for a term of four years "without regard to his political affiliations and solely with respect to his qualifications to perform the duties of his office," according to the law.

Sutherland

Chairman Hunter

Hyneman

The Civil Service Commissioners appointed were Chairman Robert L. Hunter, Chicago attorney and formerly head of the state civil service commision; Douglas Sutherland, retired executive director of the Civic Federation; and Charles S. Hyneman, chairman of the department of political science at Northwestern University.

The Commissioners named **John J. Hogan,** Chicago attorney and World War II veteran, supervisor of employment. The board instituted a reclassification program and intensified the scheduling of examinations to recruit qualified personnel.

At present more than 90 per cent of the District's employees are classified in civil service; the balance are seasonal and temporary workers.

5. NEW ADMINISTRATION BUILDING

In April, 1956, the District dedicated its new $2,000,000 administration building at the corner of Rush and Erie streets on the Near North Side.

The air conditioned, four and one-half story building scored "Firsts" in several categories:

1. The first administration building in the District's history.
2. The first governmental unit built within the sphere of the proposed Fort Dearborn project.
3. And, so far as is known, the first major governmental building constructed in this area without increasing the tax levy.

Under an unique financing arrangement, the building will be paid for out of the corporate fund with money which in the past has gone for rented quarters in the Standard Oil Building, 910 South Michigan av.

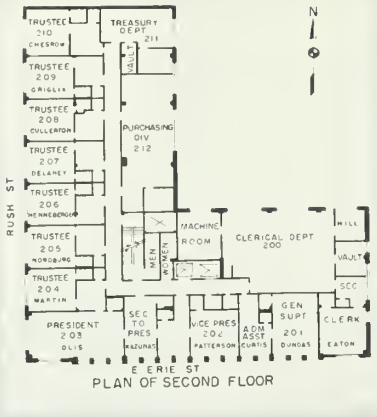
These payments, spread over 15 years, will retire the special building bonds authorized by the legislature.

The new building was constructed with an eye toward resale value, since presumably the District would participate in the governmental center of the Fort Dearborn project if and when it is completed.

Foundations and the plumbing, heating, and wiring were planned to permit the addition of at least four more stories; and the girder and uni-cellular floor construction will permit the rearrangement of partitions and wiring.

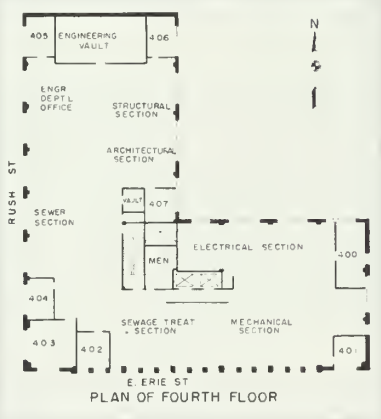
The new building provides approximately 55,000 square feet of floor space. The architects were Philip B. Maher and Frank L. Finlayson. The general contractor was Paschen Brothers Contractors, Inc.

PLAN OF FIRST FLOOR

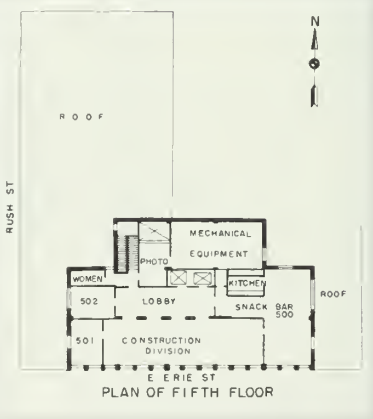


PLAN OF SECOND FLOOR

PLAN OF THIRD FLOOR



PLAN OF FOURTH FLOOR



PLAN OF FIFTH FLOOR

March 15, 1956: New administration building, Rush and Erie Sts.

5. the future

1. GOVERNOR STRATTON'S COMMITTEE

The growth problems of the Chicago metropolitan area have become an increasingly vital concern to taxpayers and governmental officials alike—particularly those problems dealing with the essential services: water, sanitation and storm drainage.

Early in 1954, Governor Stratton appointed a committee—named The Governor's Committee on Metropolitan Water and Sanitation — to study these problems and make a recommendation.

President Anthony Olis of the Metropolitan Sanitary District was named chairman. The other members were Dr. John T. Rettaliata, president, Illinois Institute of Technology; Dr. Ovid W. Eshbach, professor, engineering sciences, Northwestern Technological Institute;

James D. Cunningham, president, Republic Flow Meters Co.; General Superintendent William A. Dundas of the District; Howard R. Olson, general manager, Chicago Regional Planning Association; Clarence W. Klassen, chief sanitary engineer, State of Illinois; Raymond E. Anderson, chemist-engineer, North Shore Sanitary District;

Attorney Robert S. Cushman, past president, Civic Federation of Chicago; Louis Ancel, corporation counsel, Maywood; Trustee Casimir Griglik of the District; Alderman Herbert F. Geisler of Chicago;

William N. Erickson, member of the Cook County Board of Commissioners; Alderman P. J. Cullerton of Chicago; J. Russell Christianson, then president of the village of Oak Park;

Arthur T. Leonard, president, City National Bank and Trust Company; Randall H. Cooper, president, State Street Council; Trustee William S. Nordburg of the District; and Oscar C. Gettinger, of the Wheaton Sanitary District.

The Committee made the following recommendation to the Governor:

"Whereas, the problems of water supply, drainage, sanitation, and the rapid development of an adequate port facility including the widening of the Cal-Sag Channel are common and interlocking needs in a natural water-basin comprising:

"All of Cook and DuPage Counties, the easterly townships of Kane County, and the nine townships in Will County lying north of the line between Cook and Will Counties projected westward; and

"Whereas, commercial, industrial and residential development in the above metropolitan area could be encouraged and expanded by proper solution of these problems; and

"Whereas, at present no single governmental service agency exists which is equipped and empowered to approach these problems on a coordinated basis and solve them to the benefit of the entire area;

"Therefore, be it resolved that this Committee recommends to the Honorable William G. Stratton, Governor of the State of Illinois:

"1. The establishment of such a single governmental service authority, to coordinate and direct an united approach to these problems in the above metropolitan area.

"2. The acquisition of existing municipal utilities by said service authority be accomplished on a voluntary basis through negotiation between the service authority and the various communities;

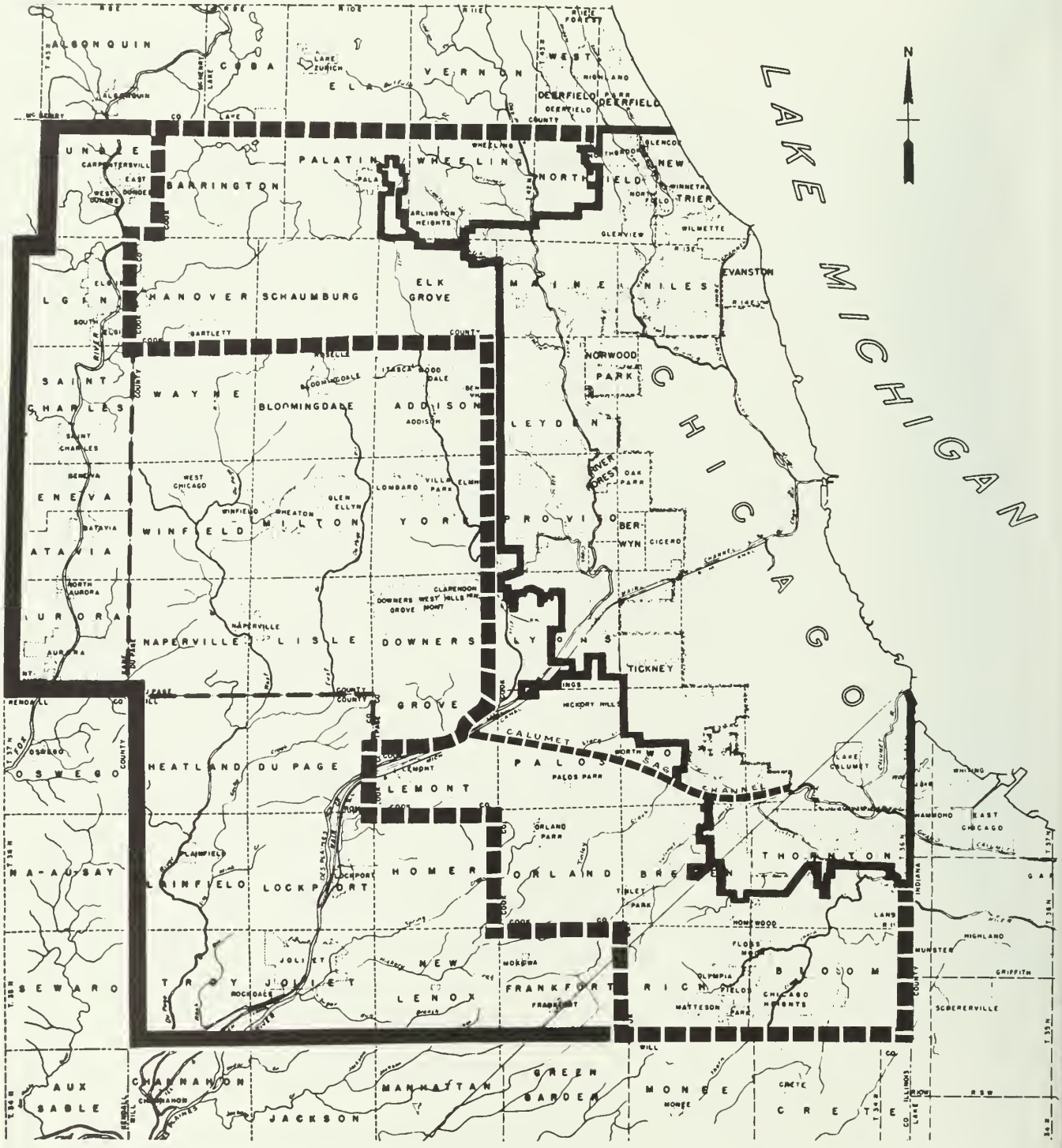
"3. The Metropolitan Sanitary District of Greater Chicago is a governmental agency which presently serves an area including 85 municipalities and renders services in the fields of drainage, sanitation and navigation and it could well be used as a base for the establishment of the governmental service authority herein above referred to."

The report was presented to the Governor at a luncheon in the Union League Club on December 14, 1954, before an audience of more than 400 civic leaders.

In his closing remarks, Chairman Olis said:

"The people of Chicagoland, in the proposed metropolitan area, are in the mood for progress—for big and bold plans. Yes, Chicagoland is on the move—if we will only give it a chance—if we will unshackle the chains of inertia and petty prejudices and permit it to rise up in a new burst of the 'I Will' spirit—if we will permit the removal of the bottlenecks that are impeding navigation, and causing storm floods and millions of dollars of damages in their wake—if we will permit a supply of water which is now lacking to the vast areas of Chicagoland that are ripe for industrial development—

"Then, in that event, you and I, in our lifetime will see this metropolitan area grow to a population of 15 to 20 million people and become the largest, the greatest, and the finest community in the entire world!"



The natural watershed of Northeastern Illinois — showing Townships and Communities in Cook, Du Page and parts of Kane and Will Counties

2. RECENT LEGISLATION

During the 1955 session of the state legislature, a series of bills based largely upon the recommendations of the Governor's Committee were introduced in the House and Senate.

Significant advances were made on three fronts:

1. The boundaries of The Metropolitan Sanitary District were expanded to include the rest of Cook County with the exception of five townships in the southeast end of the county, and subject to a referendum in the affected area in the general election of 1956. The expansion would mean an increase of about 90 per cent in the area served by the District.

2. The District was given the specific authority to cope with storm waters and to build facilities to handle flood flows such as the storm in October, 1954, which caused an estimated $25,000,000 damage.

3. The District was given the authority to build and maintain drainage and sanitation facilities, including treatment works, on a revenue bond basis.

3. THRESHOLD OF TOMORROW

As this is written, The Metropolitan Sanitary District of Greater Chicago is ending the second great phase of its history and, in common with the metropolitan area of which it is a part, stands on the threshold of tomorrow.

The first phase was the vital task of sealing off all pollution from Lake Michigan—accomplished by building the interceptors, and by reversing the Chicago and Little Calumet Rivers.

The second phase was the construction of the huge plants to treat and dispose of all the sewage originating in the area.

In the doing, the Sanitary District pioneered a little-known field and its labor and accomplishments have benefitted all mankind; each year hundreds of engineers from the four corners of the earth visit the plants and seek advice on how the system may be adapted for use in their homelands.

The pressures of increased health standards and of steadily mounting populations have thrown new emphasis on the methods and processes which permit man to live in close proximity to his neighbors—in South Africa and in the Malay Archipelago, as well as the Chicago metropolitan area.

And tomorrow?

It is apparent to even the casual observer that the problems of water distribution, waste treatment and disposal, and storm drainage—all linked by their nature and by their effect, one upon the other—will not long be allowed to hold back the growth and development of the metropolitan region:—Cook and Du Page Counties, and parts of Will and Kane Counties, a natural watershed with common advantages and common problems.

The most remote village—with its undeveloped home and industrial potential—in this region is less than 40 miles from an inexhaustible supply of fresh water, Lake Michigan. And Los Angeles is forced to transport its water 250 miles through the Colorado River Aqueduct!

The metropolitan problem of water is essentially one of distribution.

The metropolitan problem of sanitation is primarily the extension of existing facilities or the building of new units on the same pattern; the feasibility of area-wide collection, treatment and disposal of sewage has been proved emphatically by the record of the Sanitary District.

The metropolitan problem of flood control is basically the extension and improvement of the present drainage system.

These vital problems, then, are engineering in nature and comparatively simple in solution, now that the research and pioneering have been done. The chief stumbling blocks are financial and political.

The financial problem is simply Need vs. Cost; the industrial growth and population increases of the metropolitan area are setting up irresistible pressures on behalf of Need. Each day passing shrinks the factor of Cost—whether figured on a basis of per capita investment or in relation to economic return.

One day soon—perhaps a few months hence, at most a few years—the Need will overwhelm the Cost and public opinion will force the expansion of these services throughout the metropolitan area.

One stumbling block will remain: the political.

Here again The Metropolitan Sanitary District of Greater Chicago may have blazed a trail.

This stumbling block stems from the understandable and very human wish of every city, town and village to maintain its own flavor and character.

5. the future—cont'd.

Nearly every one of these communities has gone on record—volubly and violently—as opposing any suggestion of becoming a part of any municipal authority which would administer its local affairs.

Police? Schools? Town or village affairs? The present system may not be the most efficient, but these are local matters administered at grass roots level where the elected officials are close to the voters and well within reach of a cast ballot.

Even as the hue and cry has lifted against the "metropolitan authority" concept, more than a score of communities in the last three sessions of the legislature have applied for admittance to The Metropolitan Sanitary District.

This apparent paradox can be explained by three major factors, which in themselves could well set a pattern palatable to the communities of the metropolitan area and yet permit the full development of the area's potential:

1. The District renders vital service of a silent, non-political nature; it exercises no control over local sewerage systems, serving merely as the collection and disposal agent—a wholesale distributor in reverse.

2. The District is administered by a representative board elected by the people it serves.

3. The cost of this service, spread over its millions of customers, is nominal.

Translated into terms of water distribution, this would mean the District would maintain the major water mains, reservoirs, and pumping stations throughout the metropolitan region; the water would be drawn from the City of Chicago system as long as feasible, and eventually from supplemental intakes in the lake. It would be delivered at cost to each city, town and village, there to be locally distributed and locally administered.

Whatever plan is finally adopted by the Illinois Legislature to permit the metropolitan area to solve its growing problems, The Metropolitan Sanitary District stands ready to perform its task.

One of its greatest assets is the trained cadre of engineers which is its backbone, engineers with a proud record of achievement and an international reputation.

Their work in the past has helped make this one of the healthiest major population centers in the world; their work in the future could help make this the largest, wealthiest and most productive community on earth.

NOTE

This booklet was prepared with the patient help of General Superintendent William A. Dundas, Chief Engineer Horace P. Ramey, and Sanitary Engineer Langdon Pearse. Their own writings and memories were freely tapped. Among the documents available for study to those who may wish to explore more deeply are the following:

THE CHICAGO QUEST FOR POTABLE WATER

by Langdon Pearse, an article prepared for the World Health Organization.

WEST-SOUTHWEST SEWAGE TREATMENT WORKS (1950)

a technical pamphlet prepared by the engineering staff of The Metropolitan Sanitary District of Greater Chicago.

EXPERIENCE OF CHICAGO IN THE PREPARATION OF FERTILIZER, (1945)

by William A. Dundas and C. P. McLaughlin, Paper No. 2237, American Society of Civil Engineers.

INITIAL REPORT AND RECOMMENDATION OF THE GOVERNOR'S COMMITTEE ON METROPOLITAN WATER AND SANITATION (1954)

DRAINAGE CHANNEL AND WATERWAY, (1894)

by G. P. Brown.

SEWAGE DISPOSAL IN THE UNITED STATES

by G. W. Rafter and M. N. Baker (1894).

(Additional copies of this booklet are available upon request to President of the Board of Trustees, The Metropolitan Sanitary District of Greater Chicago, 100 East Erie Street, Chicago 11, Illinois.)

The New Administration Building

The Metropolitan Sanitary District of Greater Chicago

100 EAST ERIE STREET CHICAGO 11, ILLINOIS SUPERIOR 7-8900